Top: Clark Control Center for furnace control at Bohn Aluminum and Brass Corporation, Adrian, Michigan.

Insert: Separate access doors to vertical wireways simplify installation, inspection, service and maintenance.

SEPARATE VERTICAL WIREWAYS

Simplify installation and servicing of

CLARK CONTROL CENTERS

Roomy 6-inch wide vertical wireways for each section, independent of starter compartments and equipped with separate access doors, save time and money on installation of Clark Control Centers, and make them easier to service and maintain.

Ample wiring space is provided for all load and interwiring connections. Terminal boards may be located in vertical wireway adjacent to starters or at top or bottom of any section. Versatile bus-bar compartments permit the use of one to four sets of electrically isolated horizontal bus, permitting power to be fed from any or all of four different sources.

Clark Control Centers are the easiest to pre-plan and lay out because adding transformers and/or relays or changing type of construction (NEMA type A, B, or C) does not change space requirements.

Write for your copy of the 24 page illustrated book entitled "Control Centers by CLARK."

The **CLARK** **CONTROLLER** *Company*

Engineered Electrical Control

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For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineers Take New Jobs

Edward T. Rudman was recently named chief plant engineer of the Graton & Knight Co., Worcester, Massachusetts. He will also serve in this capacity for the company subsidiary, International Packings Corp., in Bristol, New Hampshire.

He started with Graton & Knight in 1925 as an electrician in the maintenance department. Mr. Rudman was responsible for much of the planning of the Graton & Knight half million dollar modernization program now nearing completion.

Clayton L. Jones was recently appointed master mechanic of Morse Chain Co., a Borg-Warner Industry.

Jones, who will headquarter in the company's main office in Detroit, Michigan, was formerly vice president of manufacturing for Hage Industrial Corp., Toledo, Ohio.

He has also served as master mechanic and superintendent for the Bradford Machine Co. of Cincinnati, Ohio and earlier as plant superintendent for the Cincinnati Gear Co.

Joseph Cleary has taken over the duties of plant engineer for the Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia, Pennsylvania.

In his new position, Mr. Cleary will be responsible for the specifications and design of all new equipment and maintenance and repair of present plant facilities.

Telegram Exchange with I.P.E.

ON THE OCCASION of the annual conference of the Incorporated Plant Engineers, **Richard H. Morris,** Editorial Director, PLANT ENGINEERING, sent the following telegram to **Hadleigh S. Seaborne,** Secretary of the I.P.E., at Scarborough, England:

To my friends and fellow members warm greetings and good wishes on another annual conference. My regret at not being with you this year is lessened by the knowledge that my compatriot, Tom Hanson, was able to carry to you the congratulations and encouragement of American plant engineers in your continued efforts to advance the profession.

Mr. Seaborne's Reply:

Thank you again for remembering our conference. Your message and the presence of Tom Hanson are further and welcome reminders that between the plant engineers of the two great industrial nations there is a close and friendly alliance which we believe will advance not only our profession but the prosperity of our two countries. We look forward to the occasion when you will again deliver your message in person.

In addition to the exchange of telegrams, PLANT ENGINEERING also received a letter from another member of the Incorporated Plant Engineers:

"I have been meaning to write to you to tell you how very glad we were to see your editor, **Tom Hanson,** at the Conference and to let you know that he made a very valuable and much appreciated contribution. All our members were, I know, delighted to have him with us and enormously appreciated hearing something of plant engineering in the United States.

"It is quite evident that nothing but good can come of cooperation between our two organizations; I do hope this will continue to flourish in the future as it has in the past." *Rowland Cobbold, W. D. & H. O. Wills, Bedminster, Bristol, England.*

AMA Divisional Conferences

DIVISIONAL conferences of the American Management Association will begin the 1954-55 fiscal year with the September 27 meeting on Personnel. New York, Chicago and Los Angeles will play host to one or more of these sessions.

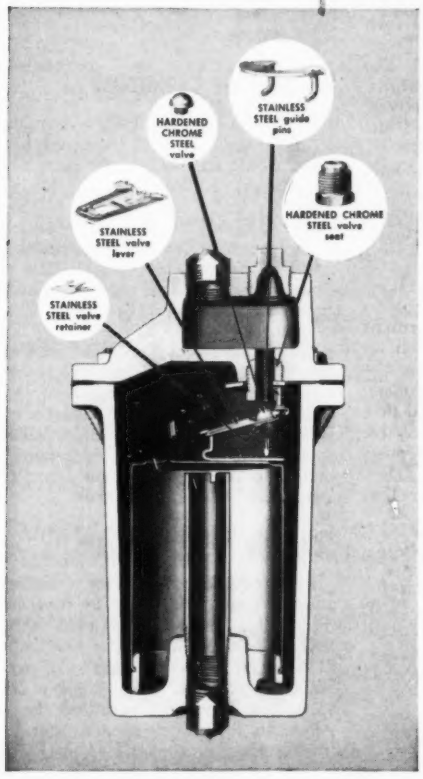
The 1954-55 divisional conference schedule is as follows: Personnel, September 27 to 29, Hotel Astor, New York; Manufacturing, October 11 to 13, Hotel Plaza, New York; Office Management, October 20 to 22, Hotel Astor, New York; Finance, November 3 to 5, Hotel Roosevelt, New York; Insurance, November 10 to 12, The Palmer House, Chicago; General Management, January 24 to 27, 1955, Hotel Statler, Los Angeles; Marketing, February 7 to 9, Hotel Statler, New York; Personnel, February 14 to 16, The Palmer House, Chicago; Manufacturing, March 28 to 30, The Palmer House, Chicago; Packaging Conference, April 18 to 21, The Palmer House, Chicago; Insurance, May 4 to 6, Hotel Statler,

***Plant Engineering** is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R., authorized by Post Office.*

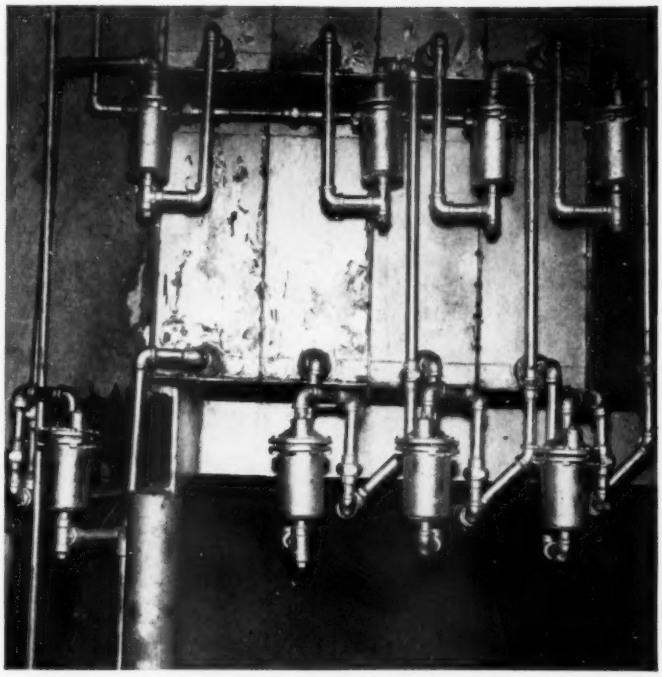
You will always get better results by putting a Steam Trap on each Steam Coil, Chest or Unit

EXAMPLE
Dryer Temperatures at
Guelph Creamery, Guelph, Ontario.

WITH GROUP TRAPPING (5 steam traps for 10 coils)	**225°F**
WITH BLOW-THROUGH (no steam traps)	**250°F**
WITH ARMSTRONG UNIT TRAPPING (10 traps—one on each of 10 coils)	**309°F**


HARDENED CHROME STEEL valve
STAINLESS STEEL guide pins
STAINLESS STEEL valve lever
HARDENED CHROME STEEL valve seat
STAINLESS STEEL valve retainer

One of the big advantages of Armstrong traps is LOW MAINTENANCE. Mechanisms in low and medium pressure traps identical in design, workmanship and materials to those in 900°F, 900 psig traps.



The example at the upper left is simply one of thousands that bear out the benefits of "Armstrong *Unit* Trapping".

When you analyze it, the reason is quite obvious. No two steam coils, chests, chambers or machines will condense steam at exactly the same rate under operating conditions. There is a greater pressure drop in the units that condense the fastest. Steam will backflow through a common drain line from a higher pressure unit to a lower pressure unit. This blocks off flow of air and retards condensate flow from the lower pressure unit. On the other hand, if you separate each unit with its own trap, that can't happen.

You will *always* get higher temperatures and lower production costs with unit trapping. Ask your Armstrong Representative about it, or write:

ARMSTRONG MACHINE WORKS

912 Maple Street, Three Rivers, Michigan

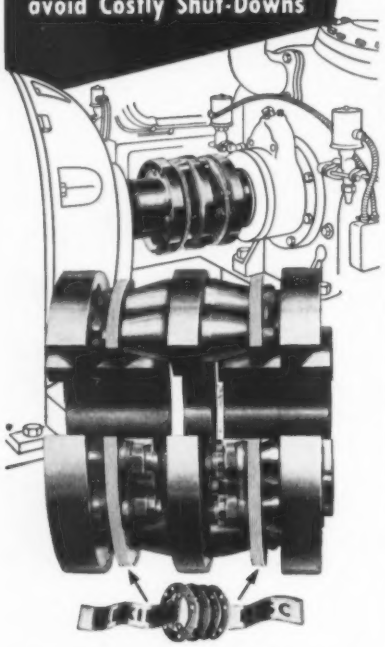
FREE—STEAM TRAP BOOK

If you don't have a copy of the 44-page Armstrong Steam Trap Book, we'll be glad to send you one. No obligation.

ARMSTRONG STEAM TRAPS

For more facts circle 503 on Reply Card

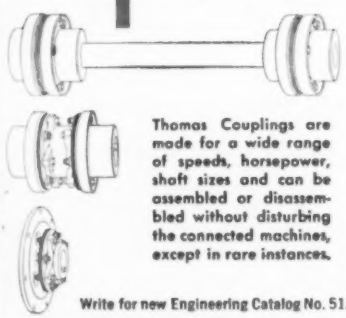
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

New York; and General Management, May 23 to 25, Hotel Roosevelt, New York.

Concurrent with the packaging conference will be the Association's 24th National Packaging Exposition, scheduled for April 18 to 21 at the International Amphitheatre in Chicago.

Additional information on any of the above conferences is available from the Registrar, AMA Management Course, 10th Floor, Hotel Astor, Times Square, New York 36, N. Y.

Wrought Alloy Designations

NEW SYSTEM of alloy designations for wrought aluminum and aluminum alloys has been developed by The Aluminum Association and it has just gone into operation.

Consisting of four-digit numbers, the new system is expected to meet all of industry's present and future needs for wrought alloys. The first digit of each designation indicates the general group to which a given alloy belongs. The last two digits identify the alloy or indicate the aluminum purity. The second digit indicates any modification of the original alloy or impurity limits.

Information on where you may obtain a copy of this phamphlet should be addressed to The Aluminum Association, 420 Lexington Avenue, New Yorl: 17.

Kudos (via telegram) to No. 1

"CONGRATULATIONS TO THE Northern Illinois Plant Engineers' Society on its initiative and prompt action in being the first group to officially join the American Institute of Plant Engineers and thus gain a signal honor doubly impressive because of the unanimous and prompt action of its nineteen members." *Dick Morris, Editorial Director,* PLANT ENGINEERING.

. . . and Kentuckiana

Congratulations are also in order for the members of the Kentuckiana Plant Engineers' Society, the second group to join the American Institute of Plant Engineers.

. . . and Baltimore

. . . a letter and check received from the Baltimore Plant Engineers' Society.

. . . and New York

. . . received letter and check from secretary of the New York Plant Engineers' Association for membership in the American Institute of Plant Engineers.

. . . and Chicago

The Plant Engineers' Society of Chicago has notified us that all members of its group have joined the American Institute of Plant Engineers.

. . . and the Granddaddy of Them All

"Congratulations to the granddaddy of all plant engineers' organizations on your unanimous action in support of the American Institute of Plant Engineers thus giving to the new national organization the prestige, experience and background of forty years of co-

Delegate Coffin

Alternate Sweet

Alternate Monty

ordinated organizational activities in gaining for the plant engineer his recognized position as the dominant factor in industry. The advice and guidance of your representatives will be invaluable at the first convention in January." *Dick Morris, Editorial Director,* PLANT ENGINEERING.

Make-Up Air Conference

FEBRUARY 14 to 17, 1955, are the dates for the Fourth Annual Industrial Ventilation Conference. As in the past, it will be held at Kellogg Center, Michigan State College, East Lansing, Michigan.

The conference will feature talks on the subject of make-up air equipment and selection as well as controls for this equipment. Problems presented for the classroom sessions will be typical of those in industry.

More information on this conference may be obtained from James C. Barrett, Ventilation Engineer, Division of Occupational Health, Michigan Department of Health, Lansing 4, Michigan, or address your inquiry to Kellogg Center for Continuing Education, Michigan State College, East Lansing, Michigan.

Schedule of Expositions

EVERY PHASE of heating, ventilating and air conditioning will be covered at the International Heating and Ventilating Exposition. It will be held at the Commercial Museum and Convention Hall, Philadelphia, from January 24 to 28. This show is sponsored by the American Society of Heating and Ventilating Engineers.

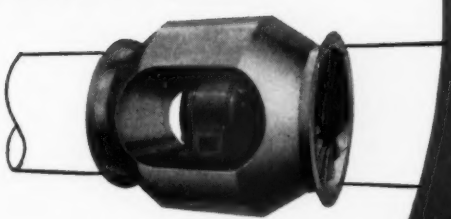
The American Society of Tool Engineers has announced that its first Western Industrial Exposition will be held in the Shrine Auditorium and Shrine Exposition Hall, Los Angeles, March 14-18.

"Concept of Obsolescence" will be the theme of the next Materials Handling Exposition to be held in Chicago during the week of May 16, 1955. The Exposition will be presented in the combined area of Chicago's International Amphitheatre and the new exhibition hall now under construction.

BIFURCATOR FAN EFFICIENTLY EXHAUSTS HOT, CORROSIVE, FLAMMABLE AND EXPLOSIVE FUMES

Bifurcator Fans exhaust fumes at *top efficiency* by avoiding a directional change in the air stream. Other fans often require a 90° change in direction of the exhaust stream with resultant loss in efficiency.

The fan motor stays clean, cool and accessible. Fumes are by-passed (bifurcated) around the motor chamber which is completely isolated from the exhaust stream.



Bifurcator Fan installs just like a section of ductwork.

A Bifurcator Fan is easily installed . . . just like a flanged section of ductwork. It can be mounted horizontally, vertically or at an angle. Lightweight and extremely compact, a Bifurcator requires no platform or supports. Bifurcators are available in sizes from 1140 CFM (12" diameter fan with 1/20 HP motor) up to 45,000 CFM (48" diameter fan with 20 HP motor). Housings and fan wheels can be fabricated of non-corrosive metals, or can be protected with a variety of corrosion-resistant coatings.

Be ready with the facts about Bifurcators next time you have a fume removal problem. Fill in and mail the handy coupon below . . . TODAY!

"DESIGN DATA FOR EXHAUST SYSTEMS" This helpful bulletin contains details, simplified data and charts. Compiled by Allen D. Brandt, Senior Sanitary Engineer, U. S. Public Health Service. Mail coupon for your FREE copy and Bifurcator Bulletin.

Certified Ratings

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DEBOTHEZAT FANS DIVISION **FREE!**
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American Machine and Metals, Inc.
East Moline, Illinois

Please send me "Design Data for Exhaust Systems" and Bifurcator Bulletin DB-4-52.

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CITY _____ ZONE _____ STATE _____

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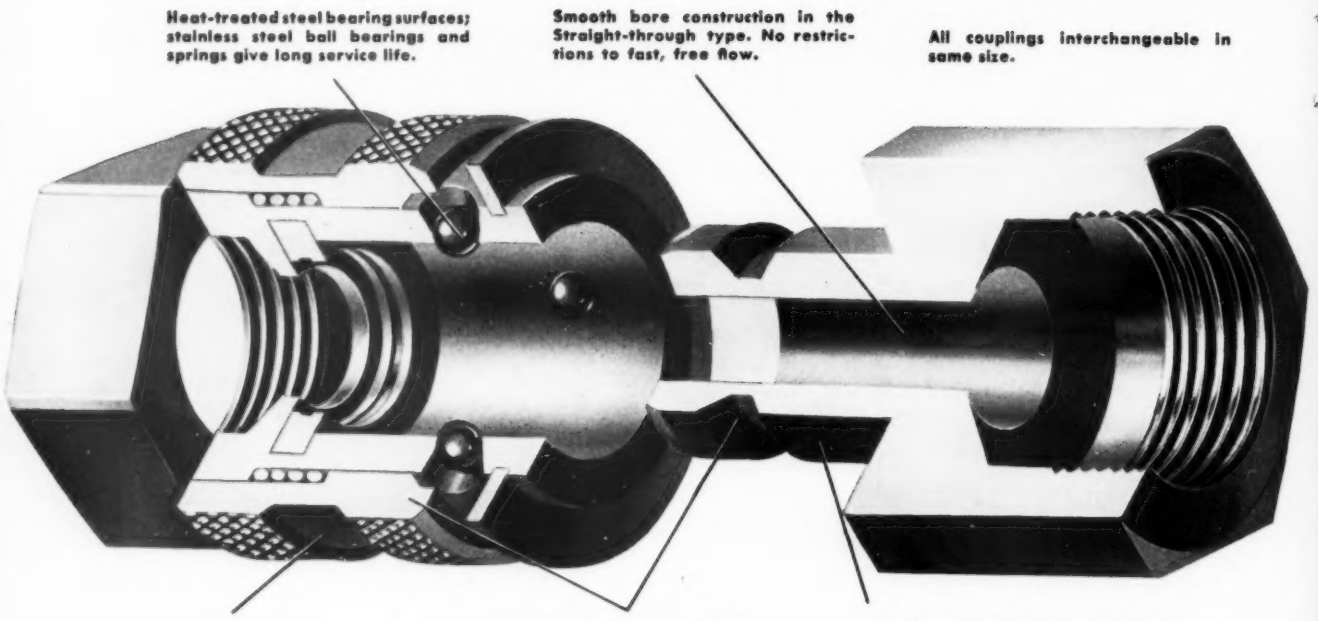
Titeflex

Introducing Quick-Seal...

the most versatile hose coupling ever made


Heat-treated steel bearing surfaces; stainless steel ball bearings and springs give long service life.
Smooth bore construction in the Straight-through type. No restrictions to fast, free flow.
All couplings interchangeable in same size.
Slim, easy-to-handle, no bulkiness or projections to snag or bend.
Permanent lock when coupled . . . can't snap-open under pressure. Retaining ring holds bearings in groove locking coupling.
360° swivel action prevents hose kinking, lengthens hose life.

Couples or uncouples in ONE SECOND—without tools

Leakproof at all operating pressures

If you handle chemicals, oils, greases, gases or liquids—in fact *any* material that will flow through a line—here's a new answer to your pipeline connection problems. For Titeflex Quick-Seal Hose Couplings make the operation faster, easier, more efficient . . . and they'll save you money.

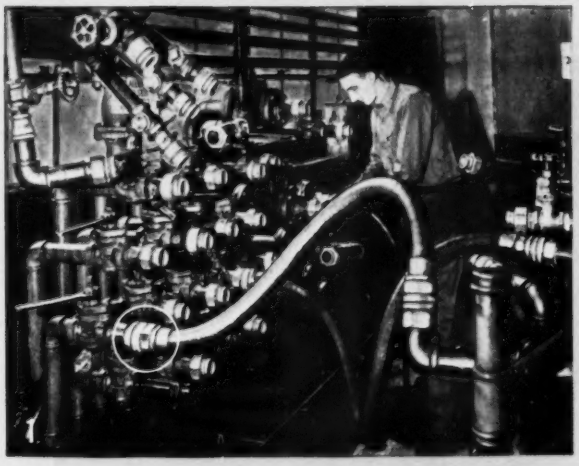
Quick-Seal Couplings are not just a variation of an old idea. They're a new approach to coupling design that gives speed and ease of handling without the bugaboos of leakage and flow restriction that have long plagued industry.

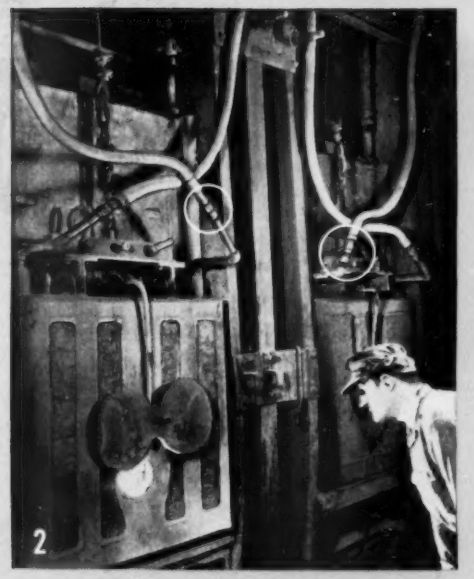
Titeflex Quick-Seal Couplings are made in three types—Straight-through, Single Check-valve and Double Check-valve, in a variety of alloys and sizes from ¼" up to 12" to meet any operating requirement.

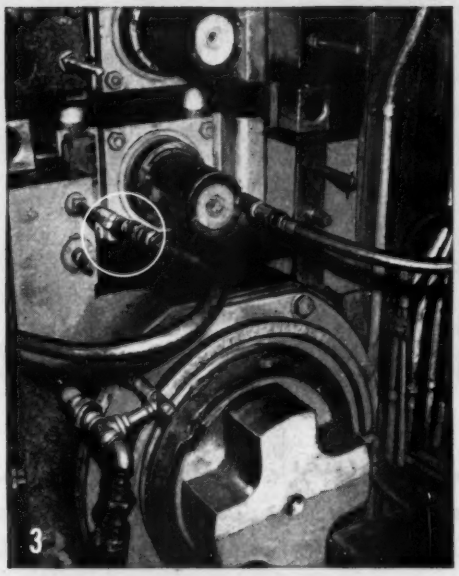
Why not investigate for yourself, the value of Quick-Seal Couplings in *your* plant. Mail in coupon today for full information on the new Quick-Seal Coupling.

Write for your free copy of the new Titeflex Quick-Seal Catalog

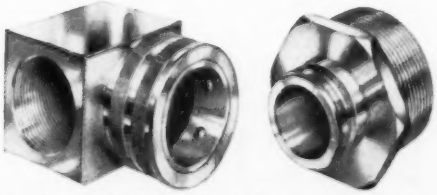
The HIGHER the Pressure the TIGHTER the Seal







Titeflex Quick-Seal Double Check-valve Couplings offer unlimited applications. No loss of pressure or fluid when line is uncoupled. Seal is effective immediately upon uncoupling.



Titeflex Block-Ell Couplings, Plugs and Caps in combination permit even greater flexibility for special requirements.

1 *Blender of oils and greases*—With this piping "switchboard", one man can do the job *in seconds* that used to take 10 minutes.

2 *Open hearth furnace*—Cooling lines can be changed right at the firedoor with only one hand—reduces safety hazard.

3 *Steel Mill*—Titeflex Quick-Seal Couplings speed changing of high pressure lines controlling spacing of reducing rolls.

4 *Filling without spilling*—Refueling diesel engines. Uncoupling without leakage drastically reduces fueling time.

Titeflex

Quick-Seal Couplings

Titeflex, Inc.
Industrial Products Division
536 Hendee Street
Springfield, Mass.

Please send complete catalog of your new Quick-Seal Couplings—without obligation.

Name_____

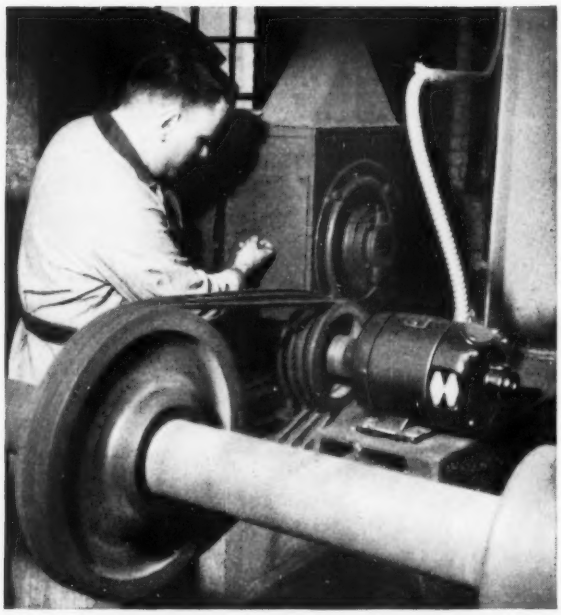
Title_____

Firm_____

Address_____

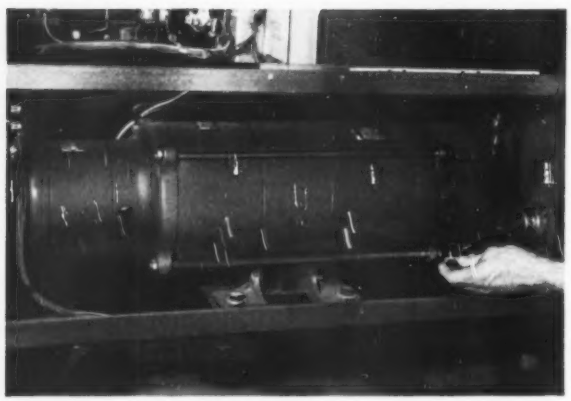
City_____ Zone_____ State_____

1 INCREASE EQUIPMENT FLEXIBILITY. G-E d-c fhp motors are excellent for machines that require variable speed to meet changing requirements. Here, blade speed is adjusted depending on hardness of metal being cut.



2 IMPROVE PRODUCT QUALITY. G-E tachometer generators accurately measure rotational and linear speed on equipment such as processing machines and conveyors where product quality depends on precise speed control.

Save 3 ways with G-E d-c equipment



3 SIMPLIFY PROCESS CONTROL. G-E amplidynes are simple and compact, yet provide fast, accurate control of current, voltage, speed, tension, or position. They're used on a variety of process equipment plus machine tools.

General Electric's small d-c equipment helps step up production, improve product quality, make machinery more flexible

Today's production machines demand flexible control of speed, torque, acceleration, and deceleration . . . flexibility that only d-c equipment can provide. That's why one out of ten industrial machines is now d-c powered.

GENERAL ELECTRIC APPLICATION ENGINEERS stand ready to help you take advantage of the benefits of d-c equipment and to assist you in the selection of d-c motors and equipment best suited for your needs. To arrange for this help . . . and for additional information on d-c equipment as shown . . . contact your local G-E Apparatus Sales Office or Distributor today. Or write General Electric Company, Section 704-13, Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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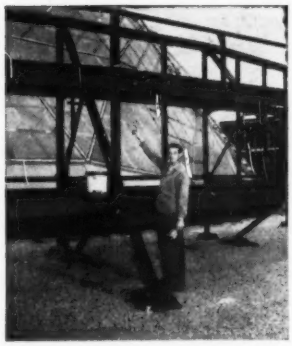
PITT CHEM licks weather at Ford Rotunda



When the Ford Motor Company remodeled the well-known Ford Rotunda for its 50th Anniversary exhibits last year, protection of new steel dome supports against year-round exposure to weather and industrial atmosphere was a high priority project. Ford maintenance engineers specified Pitt Chem Tar Base Coatings. You'll discover, too, that no other material does such a complete, economical job of protection.

Pitt Chem Coatings are formulated from coal tar pitch for one and just one purpose—to *stop corrosion*. They're tough. They're durable. And their applied film is up to ten times as thick as ordinary paint. What's more, you don't need special equipment or a degree in engineering to apply them.

If that sounds like the kind of a hard-working, never-say-Uncle protective coating you've been looking for, let's have your maintenance experts and ours make contact. A survey will cost nothing. A letter or phone call will get it started.

W&D 4957

PITT CHEM 101—For Severest Conditions
PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Compound
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Specialty Coating

PROTECTIVE COATINGS DIVISION
PITTSBURGH
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Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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NEXT TIME...ORDER SCOTTISSUE TOWELS!

1. They drink up water like a thirsty camel.
2. They're strong — even when soaking wet.
3. They're so soft that many people use them as face cloths.
4. They're clean and white — of course.
5. They're double-fold to dry double-quick.

JUST ONE SCOTTISSUE TOWEL DOES THE JOB!

ScotTissue Towels have an exceptionally high fiber content. This "bulk," plus generous size and double fold, make a case of 3,750 ScotTissue Towels weigh 46 lbs.* Some paper towels cost less for 3,750 but are 10 to 20 lbs. lighter*— hence less drying power. Write for more facts. Scott Paper Company, Dept. PE-9, Chester, Pa.

*Shipping weight

SCOTTISSUE **TOWELS**

Symbol of the right kind of washroom

"ScotTissue," Reg. U. S. Pat. Off.

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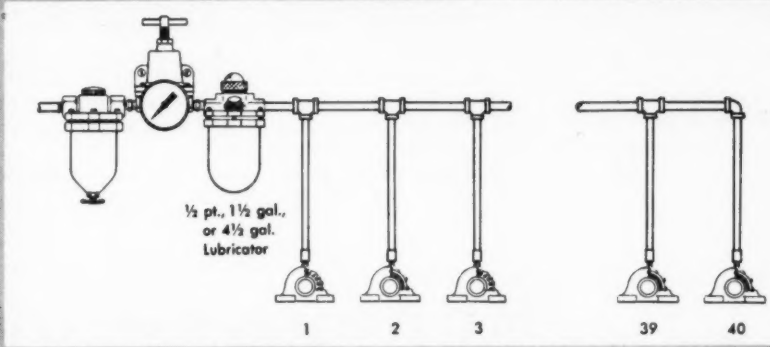
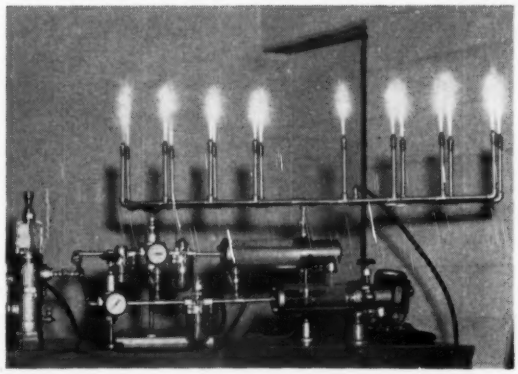
tests prove

Norgren micro-fog lubricator

gives absolutely uniform lubrication thru 40 outlets for bearings, spindles, gear boxes





Special multi-outlet testing apparatus in Norgren research laboratory demonstrates uniform distribution of Micro-Fog

Two exclusive features of Norgren Micro-Fog Lubricator—constant oil level and metering of oil feed by an auxiliary air circuit—assure an exactly uniform and accurately regulated rate of oil feed.

Performance data prove that Micro-Fog gives complete lubrication after traveling thru more than 200 ft. of pipe—assures equal distribution of lubricant thru as many as 40 outlets.

WRITE FOR NEW NORGREN BLUEPRINT MF-9

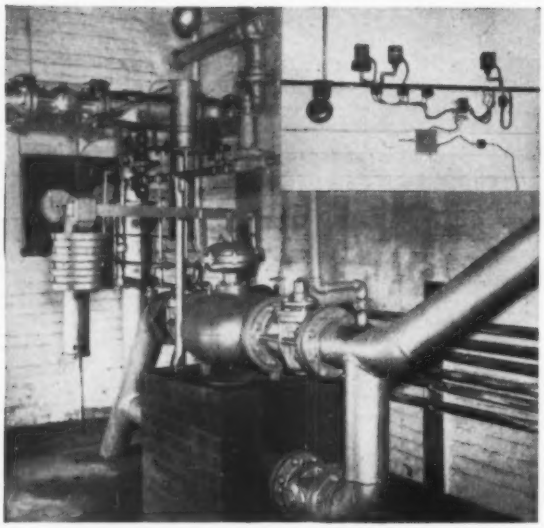
gives complete engineering data on application of Micro-Fog on bearings, gears, chains, etc.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

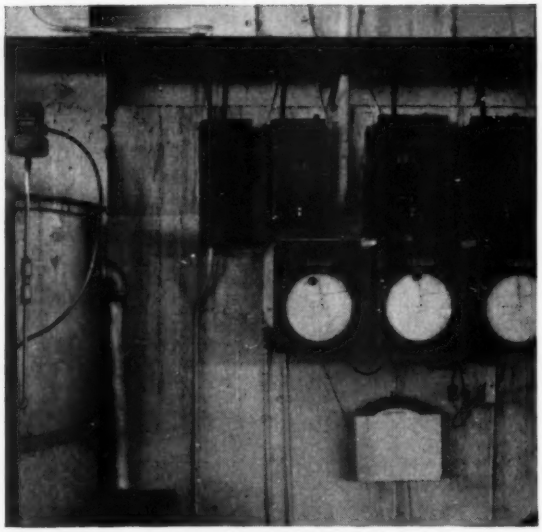
Valves • Filters • Regulators • Lubricators • Hose Assemblies

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

For more facts circle 510 on Reply Card



UNATTENDED GAS PLANT IS PROTECTED AGAINST PRESSURE FAILURES *at this central distribution point of the New York State Electric and Gas Co., Auburn, N. Y. Three Honeywell Pressuretrol units and one Honeywell Vaporstat unit sound alarm at a manned sub-station at first threat of pressure failures.* **Control equipment cost—$59.35***



SAFE OPERATION OF CAUSTIC CHARGING TANKS IS ASSURED *at the Sayles-Biltmore Bleacheries of Asheville, N.C. Whenever caustic level in tank rises to overflow danger point, a Honeywell Vaporstat unit warns operator by energizing an alarm system.*

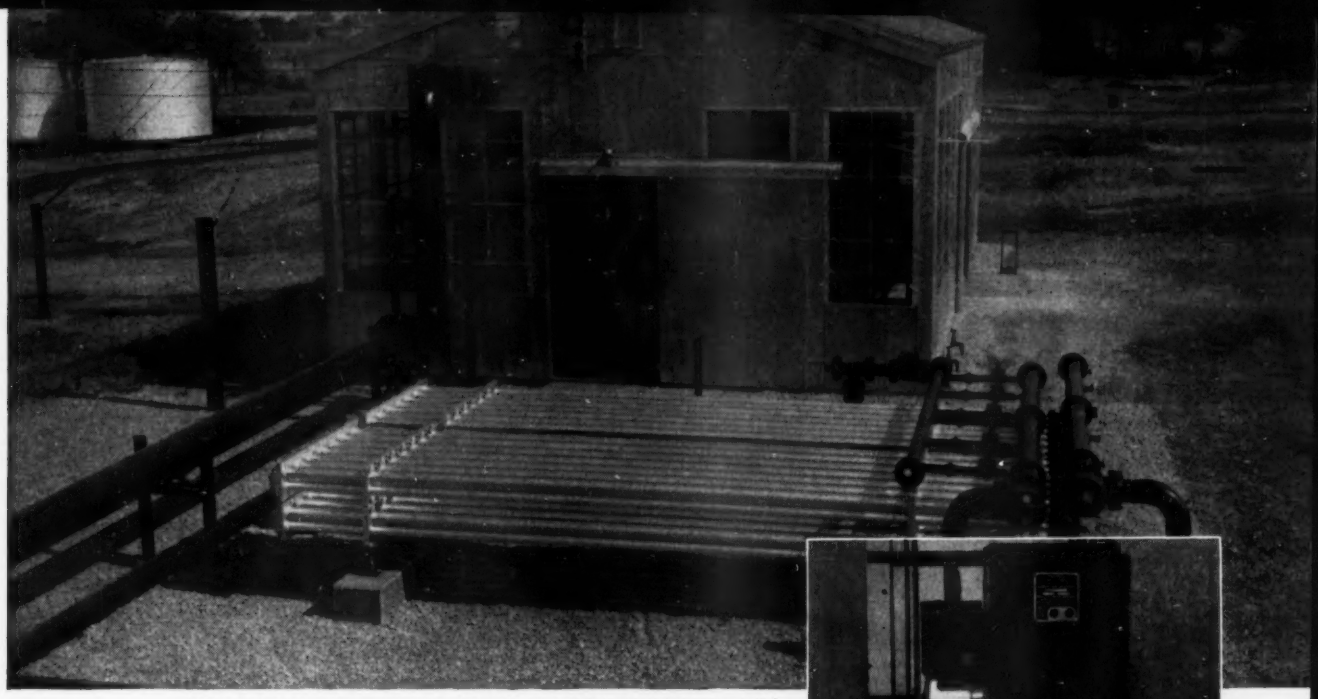
Control equipment cost—$37.25*

Honeywell Industrial

SENSITIVE ALARM WARNS OF SOLENOID VALVE FAILURE *in a water-cooled vacuum pump at the Spaulding-Moss Co., Boston, Mass. Before rising water temperature can cause serious pump damage, a Honeywell temperature controller automatically shuts off pump and signals operator.*

Control equipment cost—$21.30*

PERILOUS CLIMBS TO ROOF ARE NOW AVOIDED *at the Curtis Hotel in Minneapolis, Minn. thanks to the installation of Honeywell Modutrol and Pressuretrol units. Rooftop adjustments of a butterfly valve for desired pressure changes in an exhaust steam heating system can now be made by operator in boiler room.* **Control equipment cost—$75.75***



RISK OF FIRES FROM FLAME OR POWER FAILURE IS ELIMINATED *at this steam plant for a Shell Oil Co. installation in Southern Illinois. After a fire which destroyed the original plant, Honeywell Protectoglo combustion safeguard equipment was installed which now provides complete safety control in many phases of the steam plant operation.*

Control equipment cost—$138.04*

Controls *Increase safety*

THE safety factor is vitally important in almost any phase of production activity. Often overlooked is the fact that many solutions to weighty safety problems lie in the low-cost applications of simplified controls.

For example, in steam plant installations, the threat of fires from power failures and gas pressure fluctuations is counteracted by Honeywell Industrial Controls . . . such as the Protectoglo combustion safeguard equipment. In addition, Honeywell alarm systems and limit switches provide for immediate adjustment whenever dangerous situations threaten.

At your plant, too, versatile Honeywell Controls might well be applied to the reduction of dangers and risks and the assurance of safe working conditions for plant personnel.

Low-cost Honeywell Controls are uncomplicated in installation and in construction . . . designed to do a job effectively, inexpensively.

Throughout your plant you may find numerous opportunities for Honeywell Controls to eliminate the risk element . . . as well as increase production, reduce costs, improve quality.

Your nearby Honeywell sales engineer will be glad to discuss how you can *increase safety* through the use of these controls. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa. *Also manufacturers of a complete line of precision measuring, recording and controlling instruments.*

**Approximate cost—Prices subject to change without notice.*

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

For more facts circle 511 on Reply Card

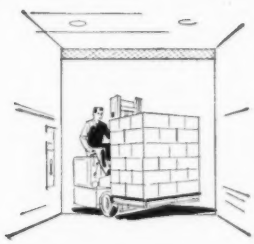
Built to absorb

OTIS HEAVY DUTY FREIGHT ELEVATORS

"PUNISHMENT"

ARE DESIGNED FOR POWER TRUCK LOADING

You've got to change your thinking about freight elevators – *when you change to industrial power truck loading!* A power truck, which may weigh 8,000 pounds or more, plus its heavy pay load, sets up unusually severe off-balance, extra static loading, and heavy impact forces in the elevator car and structure.

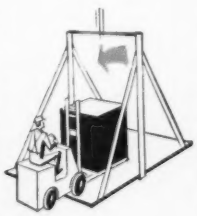


Let's examine this "punishment" in detail to see why an elevator for industrial power truck loading must be extremely rugged to stand up under these forces.

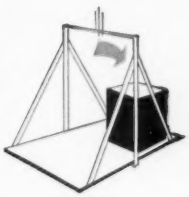
Let's start with

...OFF-BALANCE LOADING

As a power truck enters the car, it suddenly concentrates most of its weight and all of its pay load at the front edge of the platform. Then it usually deposits its first heavy pay load at a rear corner of the platform.

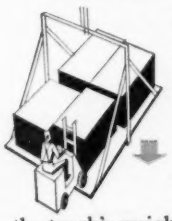


This off-balance loading "punishment" is transmitted to the car, the rails and brackets, the elevator shaft, and finally to the building structure. All of these forces must be met with increased ruggedness of design.



Now for

...EXTRA STATIC LOADING



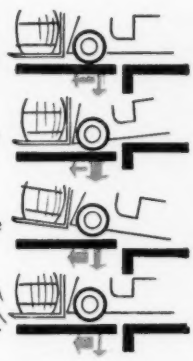
Watch the front wheels of a power truck as it deposits its final pay load. They usually stop at the front edge of the car platform. This adds up to 80% of the truck's weight to the load the elevator must withstand – which may be as high as 50% over the lifting capacity of the elevator.

This extra static loading "punishment" must be met with increased ruggedness of design.

Finally, there's

...IMPACT LOADING

Industrial power trucks travel fast, stop quickly, and deliver freight with heavy impact. They tend to tilt and twist the entire elevator structure with a variety of vertical and horizontal impact forces. See weight of the arrows in diagrams.



Impact "punishment" must be met with increased ruggedness of design. All of the forces described are at work, not singly, but simultaneously and in endless combinations.

Otis POW-R-TRUCK elevators with power-operated doors—*and lifting capacities from 8,000 lbs. up*—have the ruggedness of design, automatic controls, and traditional Otis safety needed for today's power truck loading. Write for Booklet B-705 or ask any of our 268 offices for details.

Otis Elevator Company
260 11th Ave., New York 1, N. Y.

Otis FREIGHT ELEVATORS

HEAVY DUTY · GENERAL DUTY · LIGHT DUTY

For more facts circle 512 on Reply Card

this simple idea cuts V-Belt costs

— as a V-Belt bends, feel its sides change shape!

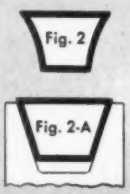
Pick up *any* V-Belt that has straight sides (Fig. 1) and bend it as if it were going around a pulley. At the same time, *grip its sides* with your fingers! You will feel the sides *bulge out* as in Fig. 1-A. Clearly, the bulging belt is forced to press *unevenly* against the V-pulley—and this concentrates wear at the points shown by arrows (Fig. 1-A).

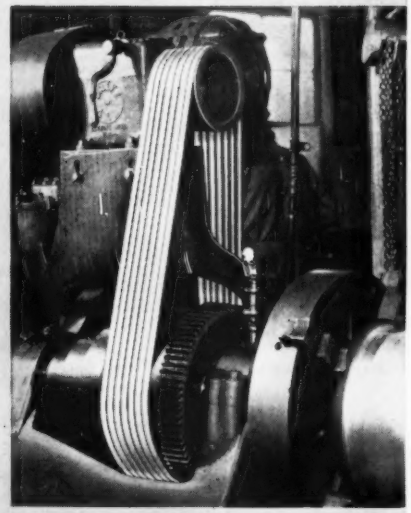
Now bend the belt with CONCAVE SIDES

(U.S. PAT. 1813698)

. . . the GATES VULCO ROPE (Fig. 2)

Instead of *bulging*, the precisely engineered CONCAVE SIDES merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the full width of the Gates Vulco Rope—and this means longer belt life and *lower belt costs* for you!





Typical Gates Vulco Rope Drive—the Gates V-belts are built with Concave Sides to insure longer belt wear.

When you buy V-belts, be sure to get the V-belt with the CONCAVE SIDES — the Gates Vulco Rope!

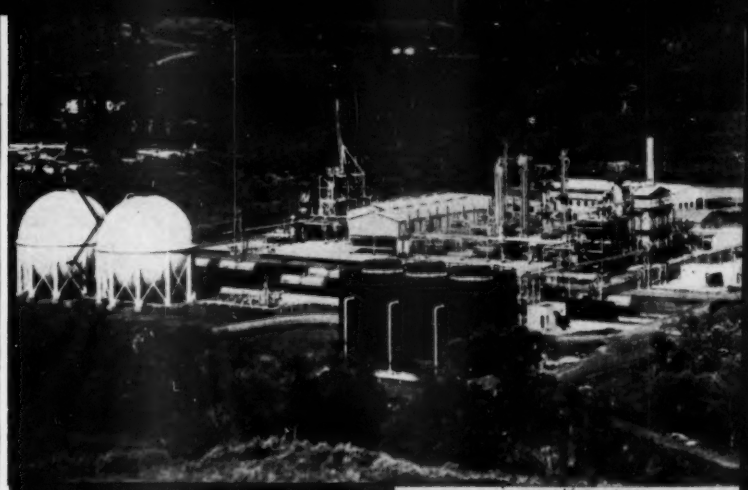
Gates

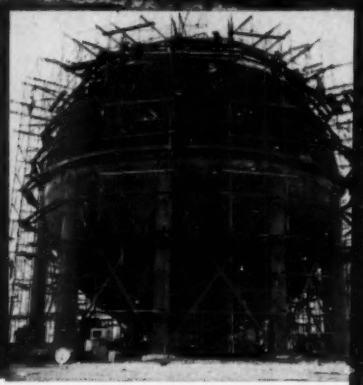
VULCO ROPE DRIVES

THE GATES RUBBER COMPANY
DENVER, U.S.A.
CS-5411

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

For more facts circle 513 on Reply Card





At left workman applies lightweight FOAMGLAS easily and quickly. At lower right is shown the sphere during installation of FOAMGLAS. Above is Shell's Ventura plant. The two spheres are insulated with FOAMGLAS.

FOAMGLAS stay-dry insulation helps SHELL keep ammonia a constant 39°

Temporary storage of 3 million gallons of anhydrous ammonia in three huge refrigerated spheres is strictly routine now at Shell Chemical Corporation's new plants at Ventura and Kerman, California, thanks to the use of FOAMGLAS to insulate the million gallon spheres.

Two years ago Shell Chemical invested $10,000,000 in this new plant. Its product is pure ammonia which is handled as a liquid and kept in that state by storing it at a pressure of 50 psi and by refrigerating it to 39° F. For this purpose Shell erected two 65 ft. diameter spheres at Ventura and one at nearby Kerman.

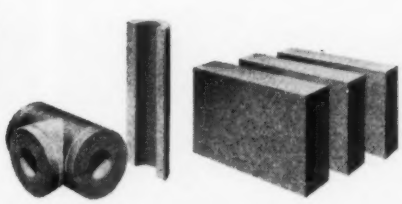
Keeping ammonia constantly at 39° F. calls for good insulation of the spheres. One of the reasons FOAMGLAS was selected for the job is that it stays dry. No other insulation has waterproof, sealed glass cells to provide constant insulating efficiency and protection of the spheres from corrosion.

FOAMGLAS has other unique properties too. It's fireproof, acid-proof and unaffected by contact with ammonia . . . further reasons why cellular glass was chosen to insulate all of the other refrigerated equipment and piping throughout these plants.

You will really profit when you insulate with FOAMGLAS. For the full story, send today for a sample and our booklet describing the use of FOAMGLAS to insulate piping, tanks and other equipment.

PITTSBURGH CORNING CORPORATION
Dept. PE-114 • One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®
the cellular, stay-dry insulation



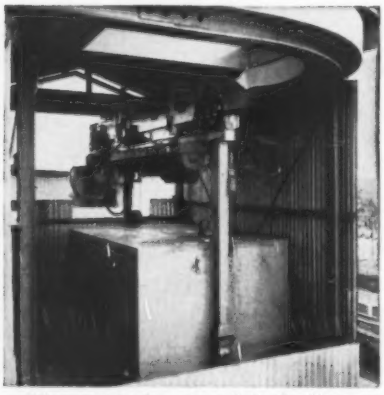
PITTSBURGH PC CORNING

Pittsburgh Corning also makes PC Glass Blocks

For more facts circle 514 on Reply Card

AUTOMATIC "UP AND OVER" TRANSFER

Three boxes—450 lbs. each—are loaded in car. When doors are closed the car raises to carrier.

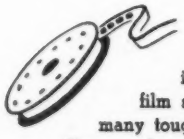


When car reaches upper limit, the Mono-Tractor propels carrier on the MonoRail to No. 2 mill.

SAVES $30,000 PER YEAR

Here is an "Up-and-Over"* system that eliminates 72 hours of handling labor per day. It automatically transfers 180 full bobbin boxes from three floors of one mill to one floor of another and returns the empties. Estimated savings in labor, trucks, floors and traffic congestion run upwards of $30,000 per year.

It is another of the many examples of American Mono-Rail engineering for low-cost handling within space limitation. Let one of our field representatives explain further the versatility and low maintenance of American Mono-Rail equipment.



***"UP-AND-OVER"**

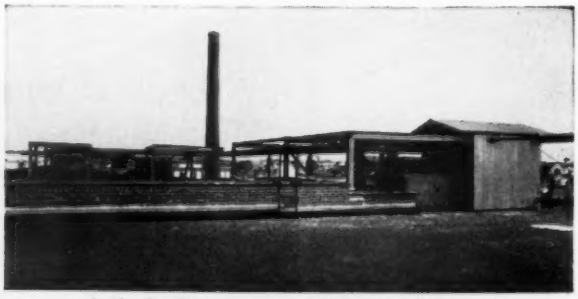
is the title of our 16-mm. sound film showing how MonoRail solves many tough handling problems. Please allow us three weeks to schedule showing.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13123 ATHENS AVENUE • CLEVELAND 7, OHIO

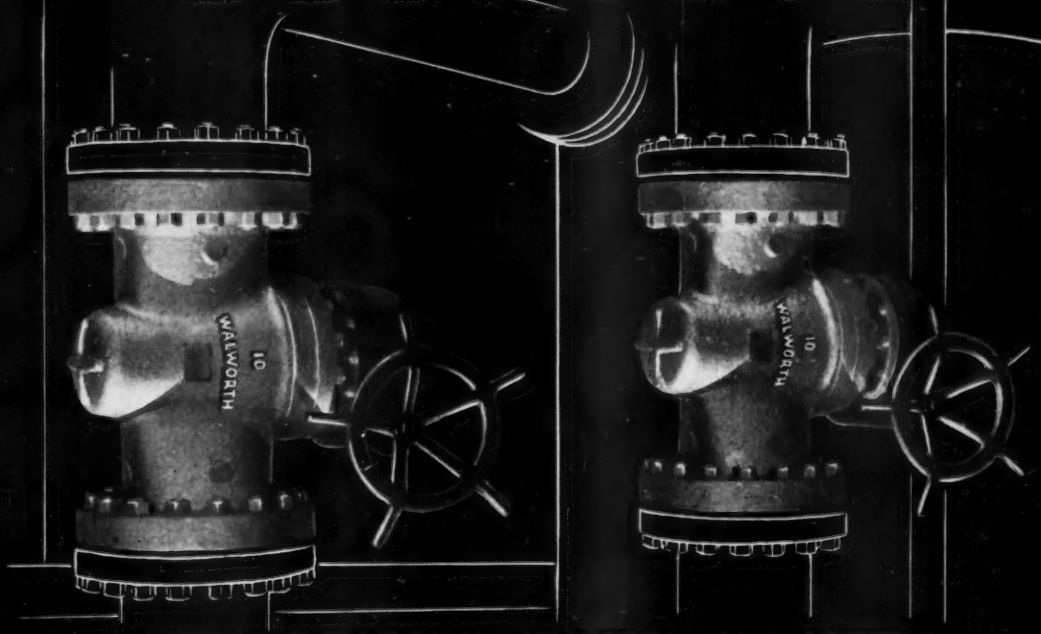
Carrier travels at 50 f.p.m. around curves—150 f.p.m. on straight track with slow approach at towers.



At No. 2 mill car lowers to third floor for delivery of full boxes and return dispatch of empties.

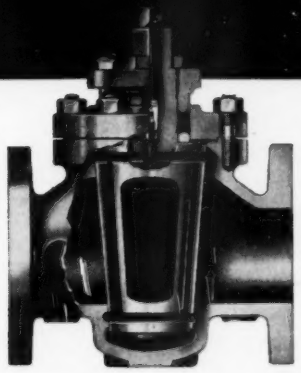
For more facts circle 515 on Reply Card

WALWORTH



LUBRICATED PLUG VALVES

Better because ... **They are *pressure sealed* with an insoluble lubricant readily renewed while the valve is in service. Lubricant completely surrounds the plug ports assuring a tight seal against leaks. It also insures ease of operation by reducing friction between the body and the plug while at the same time protecting the finished surfaces against corrosion and wear.**



Lubricant system of a Walworth No. 1700F Regular Gland, Wrench Operated, Steel-iron, *Lubricated Plug* Valve. Other Walworth *Lubricated Plug* Valves include Single Gland, and Ball Bearing types. Sizes to 30-inches — pressures to 5,000 psi, and for vacuum service.

Walworth Lubricated Plug Valves are the most satisfactory valves available for the handling of gritty suspensions, and many other destructive, erosive, and corrosive industrial and chemical solutions.

They are ideal for general refinery and pipeline service.

For full information see your Walworth Distributor, or write for your copy of Bulletin 111. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For more facts circle 516 on Reply Card

new

. . . and more efficient, too!

- Custom-designed for regular production!
- Built for a lifetime of service!

LELAND LOADSTAR MOTORS

Here are LELAND'S outstanding qualifications for producing the finest of motors to the new NEMA standards:

★ Extensive and continuing experience in developing and producing, for our Armed Forces, hundreds of thousands of *portable* generator units and *airborne* inverter units and controls. Leland designs consistently meet and frequently surpass specifications so satisfactorily that they virtually become the criteria for other suppliers.

★ More than 33 years' "creative electrical engineering" experience in supplying manufacturers with high-quality custom-built special motors, or standard Leland motors adapted to the particular requirements of their products.

★ The combined, industry-wide engineering and development resources of American Machine & Foundry Company.

★ A unique combination of modern, mass-production facilities and custom craftsmanship, resulting in extra care in critical operations and greater versatility in production.

Hitch your product to a "Loadstar"!

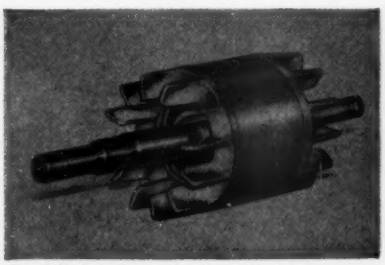
YOUR NEWEST PRODUCT will have added value, added efficiency, when powered by the equally modern, equally efficient LELAND *"Loadstar"!* It's the most advanced LELAND motor ever designed for regular production!

LELAND engineers have taken full advantage of the rare opportunity presented by the reframing program to incorporate into new LELAND designs many *added* improvements not actually a part of simple reframing. In this way every user of a new *"Loadstar"* motor benefits directly from LELAND's exceptionally pertinent experience in the continuing development and manufacture of special and lightweight power units and inverters for Aviation and the Armed Forces... one of the roles in which LELAND's creative electrical engineering has particularly distinguished itself.

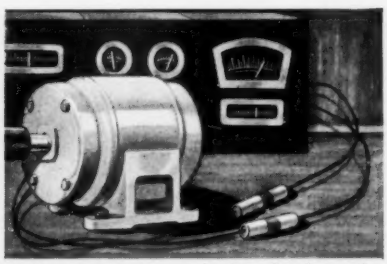
No wonder, then, that the *"Loadstar"* outshines them all!

Some features of this new line of smaller, lighter integral horsepower motors are shown below. Others were covered in a previous advertisement. For the complete story, and frame dimension details, write for Bulletin No. 103.

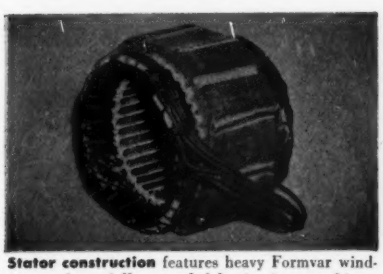
Generous-sized, double-shielded, sealed ball bearings, *lubricated for life*, prevent entrance of abrasive grit. Precision-machined bearing bores give uniform rotor-to-stator air gap.



Simplified design: reduced number of parts; cast fans have same diameter as rotor, permitting rotor removal from either end; standardized components fit open or enclosed frames.

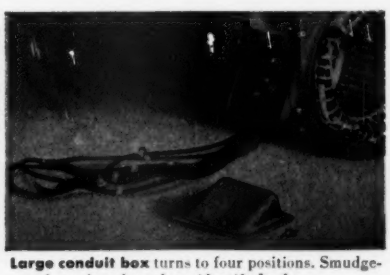


Performance tests prove, despite reduced size, the new motors attain higher efficiency, higher full-load speeds, approximately 30% higher starting torque and breakdown torque.



Stator construction features heavy Formvar windings and carefully annealed lamination punchings.

Non-rusting, easily read aluminum name plate plainly shows all wiring connections.



Large conduit box turns to four positions. Smudge-proof numbered markers identify leads.

New "Loadstar" polyphase, dripproof motors in 1, 1½ and 2 HP (180 frames) now ready. Totally enclosed and explosion-proof frames—also higher horsepower and single phase motors—available soon.

Another AMF Product

LELAND MOTORS

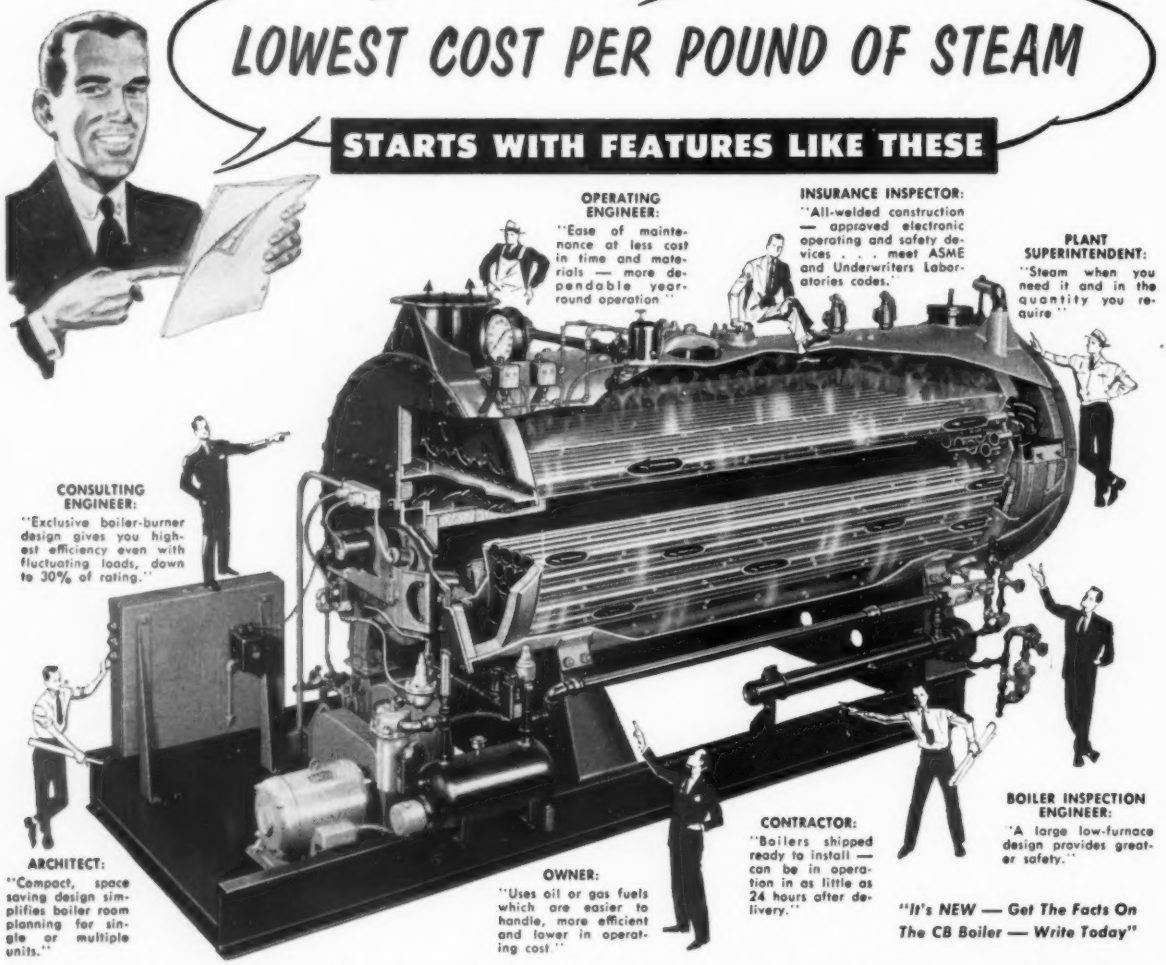
LELAND motors in previous NEMA standard frames will continue to be available for replacement and the convenience of present customers.

THE LELAND ELECTRIC COMPANY, DAYTON 1, OHIO, *Division of American Machine & Foundry Company*

For more facts circle 517 on Reply Card

LOWEST COST PER POUND OF STEAM

STARTS WITH FEATURES LIKE THESE


OPERATING ENGINEER:
"Ease of maintenance at less cost in time and materials — more dependable year-round operation."
INSURANCE INSPECTOR:
"All-welded construction — approved electronic operating and safety devices . . . meet ASME and Underwriters Laboratories codes."
PLANT SUPERINTENDENT:
"Steam when you need it and in the quantity you require."
CONSULTING ENGINEER:
"Exclusive boiler-burner design gives you highest efficiency even with fluctuating loads, down to 30% of rating."
ARCHITECT:
"Compact, space saving design simplifies boiler room planning for single or multiple units."
OWNER:
"Uses oil or gas fuels which are easier to handle, more efficient and lower in operating cost."
CONTRACTOR:
"Boilers shipped ready to install — can be in operation in as little as 24 hours after delivery."
BOILER INSPECTION ENGINEER:
"A large low-furnace design provides greater safety."

"It's NEW — Get The Facts On The CB Boiler — Write Today"

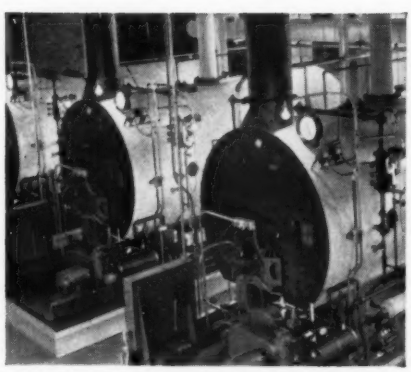
that's why you profit most from Cleaver-Brooks self-contained boilers

• Top to bottom, inside and out, you get more money-saving features when you specify or buy Cleaver-Brooks self-contained boilers. You make an *investment in quality* that pays off in lowest net cost per pound of steam for processing or heating.

YOU BENEFIT from more than 20 years of experience, working closely with men who have made it their business to be *right* about boilers. You profit from complete coordination throughout planning, installing, supervising and final operation.

YOU BENEFIT from self-contained design and original four-pass construction. These Cleaver-Brooks engineered "firsts," plus forced draft, 5 sq. ft. of heating surface per boiler hp, and exclusive burners, all contribute to highest heat transfer. Guaranteed 80% thermal efficiency when firing with oil is the direct result!

Whether you're planning a new steam plant or modernizing, make certain you get the complete Cleaver-Brooks story before you buy. See your Cleaver-Brooks representative, or write for catalog AD-100. Cleaver-Brooks Company, Dept. M, 306 East Keefe Avenue, Milwaukee 12, Wisconsin, U.S.A. *Cable Address CLEBRO—Milwaukee4—All Codes.*



One typical owner can count on yearly savings ($15,000 fuel and $10,000 labor) from this battery of three 150 hp Cleaver-Brooks self-contained boilers.

•

NOW — FIRST SIZES OF THE CB BOILER ARE MADE IN CANADA, TOO.

•

Cleaver Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

BOILERS . . . STEAM OR HOT WATER . . . FOR HEATING OR PROCESSING, IN SIZES FROM 15 TO 500 hp, 15 to 250 PSI.

For more facts circle 518 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Ideas for Automation—Bulletin 110 illustrates examples of automation in metalworking, food processing, chemical, and ceramic plants. Each shows how woven wire conveyor belts contribute to automatic operation, how they combine movement of materials with processing operations. The Cambridge Wire Cloth Co.

102 Sectional Belt Conveyor—A complete set of belt conveyor components pre-engineered for on-the-job assembly is described in Bulletin 1454. Discusses chief features, lists components and gives specifications for all parts. Points out that conveyor components can be purchased from stock as a package unit for a complete belt conveyor installation, or as repair or replacement units. Stephens-Adamson Mfg. Co.

103 Hand Lift Trucks—Moving and storing of many types of multi-unit loads by pallet hand lift trucks is pictured and described in 12-pp Brochure P-673B. Illustrated with application photos, brochure features a section describing pallet types and designs. Pictures and specifications of a variety of company's lift trucks are also included as well as cutaway photos showing operation of both the hydraulic and mechanical lifting mechanism. The Yale & Towne Mfg. Co.

104 For Smoother Riding Fork Lifts—Bulletin 1100 explains how this company's accumulator cushions shock and vibration in hydraulically operated fork lift trucks. Describes benefits in terms of reduced spillage and breakage, improved performance, less operator fatigue and longer fork truck life. Greer Hydraulics Inc.

105 Plywood Containers—This 24-pp illustrated case history booklet describes the manufacturing processes of plywood shipping containers—from forest to finished product. There is also a section showing how plywood shipping containers are engineered to give maximum protection to customer products. Another section is devoted to typical case histories, documented with "before and after" photos which show how tough shipping problems have been solved. Atlas Plywood Corp.

106 Bridge Cranes—This 6-pp bulletin describes company's new line of overhead bridge cranes. Covering single girder, double girder, and box girder cranes, the bulletin contains general specifications and applications data. The Michigan Crane & Conveyor Corp.

107 Excavating, Drilling, Material Handling Equipment—A new edition of company's general catalog, GC-5A, describes their complete line of excavating, drilling and material handling equipment. Designed for quick reference, the 70-pp catalog features concise copy, condensed specifications and over 100 photo-illustrations of company's machines on specific jobs. Several recent additions to company's products are included. Bucyrus-Erie Co.

INSTRUMENTS, CONTROLS

108 Measuring and Control Equipment—Various types of control and measuring equipment, for both primary and secondary devices, are illustrated in Bulletin 050. Included are short descriptions and characteristics of standard and eliptical Venturi tubes, as well as parabolic flumes used as primary devices to actuate secondary indicating, recording and totalizing units. Illustrates miscellaneous types of air release and air inlet (vacuum breaking) valves and a new controlled closing valve. Simplex Valve and Meter Co.

109 Control and Telemetering Instruments—Twelve-pp Bulletin DMO35 lists and illustrates recording automatic controlling, and telemetering instruments. Features Metagraphic pneumatic transmission instruments, which divide functions of measuring, recording, and controlling into three separate instruments to achieve maximum flexibility in application. Illustrates full line of recorders and controllers for temperature, flow, liquid level, mechanical motion, running time, count, operation and speed. Includes electric and electronic instruments for measuring current, voltage, power, and other variables which can be translated into electrical quantities. The Bristol Co.

110 Liquid Level Gage—Catalog 246, 8-pp, covers in detail company's three standard types of convex scale and flat scale Truscale remote reading gages, showing how they protect equipment by bringing the liquid level down to where it can easily be seen. Included are features of design and construction; description and schematics of operation; charts illustrating three types of datum columns; descriptions of typical applications; and information on alarms, repeaters. Jerguson Gage & Valve Co.

111 Valve Controls—Catalog L-54, 22-pp, describes the LimiTorque control, designed to limit amount of torque applied to valve operating parts and to eliminate need for manual operation of valves. Illustrates and describes the latest LimiTorque SMA valve control for large or small valves; also provides operational details. Power plant, disposal plant and other installations are pictured. Philadelphia Gear Works, Inc.

112 Industrial Control Counters—Descriptions of equipment and techniques for controlling industrial equipment by means of predetermined electronic counters are provided in this 20-pp booklet. More than a dozen typical applications are explained and illustrated by diagrams. Describes counters capable of being preset to apply control after any number of counts from 1 to a million, also count detectors for converting physical increments into electrical impulses. Potter Instrument Co., Inc.

ELECTRICAL EQUIPMENT

113 Electrical Insulation—Three descriptive sample folders introduce a new series of composite asbestos electrical insulations recently added to the Quinterra and Quinorgo line. The folders contain samples for testing and experimentation plus descriptive information covering application, packaging, physical and electrical properties and pyrolysis resistance. Folder EL-54A covers Quinterra type 3-GR, a Class H electrical insulation for operating temperatures to 250 C. Folder EL-49A covers Quinterra type 5-GR and type 5-GL, Class B purified asbestos electrical insulations for temperatures to 150 C. Folder EL-55A covers Quinorgo 4000-GR and 4000-GL, economical Class B purified asbestos insulations. Johns-Manville.

114 Electrical Insulating Materials—Of special interest to plant engineers, 48-pp Catalog 54 provides helpful information on wire and tubing, an appendix which defines technical terms, and tables of insulation resistance temperature coefficients and temperature conversion. Contains specific data concerning wires and cables, plastic tubing, coated tubing and sleeving, and identification markers. Product performance and specifications are given, also ordering information. Pictures and diagrams show applications. The William Brand and Co., Inc.

115 Generator Voltage Regulators—Company's "rocking contact" generator voltage regulators are illustrated and described in two 12-pp bulletins. Booklet 3090 contains technical descriptions of regulators designed for small and medium size a-c generators rated from 20 to approximately 438 kva. Booklet 3095 describes a regulator for medium and medium-large a-c generators designed for use in regulating the voltage of generators rated from 438 to approximately 1175 kva. Brown Boveri Corp.

116 Corona Test Sets—Information on corona testing equipment for non-destructive evaluation of electrical insulation is presented in 8-pp Bulletin 66. Describes general principles upon which tests are based. Discusses method of evaluating a series of pulses and how it is applied in the testing apparatus. Various models of the test set are described and specifications given. James G. Biddle Co.

117 Commutator Motors—Catalog EI-2A offers a quick reference to electrical and physical characteristics of a line commutator motors, as well as governor units. The 22-pp brochure includes sections on field, shunt, and universal wound motors, as well as permanent magnet and separately excited types. In addition, performance curves, dimensional drawings and specifications are given for each type listed. Electric Indicator Co., Inc.

118 Industrial Relays—This series of data sheets, Circulars 1801-1805, give detail descriptions on a complete line of industrial relays, plug-mounted for advantages in assembly, inspection, servicing, and maintenance. Dimensional drawings, wiring diagrams, and specifications are provided for plug-mounted relays. Automatic Electric Sales Corp.

119 Batteries for Control Switchgear—This company's PlastiCal (lead calcium) and Plasti-Cell (high-tensile alloy grid) batteries for control, switchgear, and auxiliary power are described as to design, application and performance in Bulletins CP-536 and CP-537. Specifications, dimensional data included. C & D Batteries, Inc.

120 Fittings and Fixtures—Catalog 55 is a 72-pp ordering book covering a line of conduit fittings, plugs and receptacles, lighting fixtures, safety switches, circuit breakers and floodlights. Fully illustrated and indexed, includes prices, suggestions for use. The Pyle-National Co.

VALVES, TRAPS, PIPING

121 Air Release Valves—Bulletin 654 describes three styles of air release valves used for venting air from hot water heating systems, water mains, tanks in both deep and shallow well pumping systems, water filters and systems in water works, and for releasing air or gas from other liquid lines and tanks under pressure. Included is a capacity table showing cu ft of free air handled. The V. D. Anderson Co.

122 Pressure Reducing Valves—New 6-pp Bulletin W-3 completely describes G-A cushioned water pressure reducing valves, which automatically reduce an existing high pressure to a predetermined low pressure. The installation, operation, adjustment, servicing, and specifications are fully covered. Golden-Anderson Valve Specialty Co.

123 Rotating Disc Valves—A line of standard 4-way hand, foot, pilot, power, and solenoid operated valves built to operate single or double acting pneumatic and hydraulic cylinders and motors is described in 16-pp Bulletin 1010. Stresses rotating disc construction for longer wear, integral disc and stem for greater rigidity and durability, and variety of controls for most suitable operation. Dimensions and weights, application diagrams, circuit diagrams, parts list and accessories are included. Ledeen Mfg. Co.

On pages 195-196 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

124 Strainers and Relief Valves—Eight-pp Catalog Section 12-T presents dimensions and design details for company's forged steel strainers and relief valves, including the newly designed union bonnet strainers in sizes 1¼ in. to 2 in. Gives tips on installation and maintenance and points out its many uses in industry. Edward Valves, Inc.

125 Hydraulic Control Valves—Eight new hydraulic control valves with ball detent for position locking are described in 26-pp Section 4 of this company's Catalog 200. Included are six three-position, four-way valves, and two two-position, four- and three-way valves. Dimensional data and typical circuit diagrams are provided. Logansport Machine Co., Inc.

126 Thermostatic Traps—Repair Parts Catalog RTT-554 illustrates and describes company's line of thermostatic traps. Includes photos of the parts, specifications, and a list of company prices. A table of instructions for servicing is appended. Hoffman Specialty Mfg. Corp.

127 **Sewage Plant Piping**—Case Study 101 on a new mid-western sewage treatment plant lists corrosive services in which wrought iron is used to guard against premature failures. Gives reasons for specifying wrought iron in plants. A. M. Byers Co.

MECHANICAL POWER TRANSMISSION

128 **Shaft Mounted Drives**—Plant engineers who use machines requiring input speeds between 420 and 10 rpm in the range between ½ and 30 hp, will be interested in 8-pp Bulletin 7101. Contains complete information—design data, selection tables, dimensions, weights, installation photos—on this modern type of standard gear drive designed for high ratios of speed reduction in limited space, with savings in initial and installation costs. The Falk Corp.

129 **Improved Transmission Belt**—Brochure 6638, 8-pp, describes the Poly-V-drive, a new concept in belt power transmission. Design characteristics of the single, endless belt with molded lengthwise ribs, are explained in line-drawings that show 14 advantages of the drive. Brochure uses V-belts and sheaves as a standard for comparison of Poly-V with conventional drive. Text and line drawings explain why drive gives more contact area and more horsepower, offers other advantages. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

130 **High Capacity Gearing**—A quick picture of design improvement opportunities afforded through size, capacity and cost advantages offered by manufacturer's Duti-Rated Lifetime gearing is presented in 8-pp Bulletin DRB, 15 M 554. Dramatizes advantages with comparative photos of a heavy-duty transmission before and after application of this gearing. Illustrates other applications of the gearing in materials handling equipment, pumps, processing equipment. Foote Bros. Gear and Machine Corp.

PUMPS, PUMPING

131 **Vertical Pumps**—Bulletin B-1700, 12-pp, presents four features which distinguish close coupled vertical pumps and suggest their use in transfer of process liquids and water—flexibility of construction; adaptability to pumping system's present available NPSH; space saving design; and availability in both transfer-type and process-type construction. Includes many diagrams and full specifications. Peerless Pump Div., Food Machinery and Chemical Corp.

132 **Proportioning Pump**—Six-pp Bulletin AP-54 describes the Hills-McCannameter—a new type packless proportioning pump. Tells what the pump is; what it will do; why it was designed and how it works. Diagrams essential design features and shows how the pump can be used where a conventional pump might prove troublesome. Hills-McCanna Co.

133 **Circulating and Coolant Pump**—Form 7074-D, 20-pp, shows a line of Motorpumps with totally enclosed motors. Arranged for easy selection, a pictorial index helps to locate pages describing size and type of pump desired. Data provided includes performance curves, cross-sections, dimensions, descriptive material for each particular pump class. Horizontal and vertical units are described in fractional and integral horsepower sizes, as are cradle and flange mounted units meeting JIC standards. Ingersoll-Rand Co.

134 **Controlled Volume Pumps**—Bulletin 1253, 24 pp, describes and illustrates use of controlled volume pumps as flow controllers, ratio controllers and final control elements in process instrumentation. The first section describes various types of controlled volume pumps and their operation; shows how stroke length and speed adjustment can be effected manually and automatically. The second section contains process flow diagrams of applications in chemical, petroleum, paper, food, water treating and other industries. An engineering data section contains information on effect of fluid characteristics, piping on operation. Milton Roy Co.

135 **Hydraulic Pump**—Complete information on design, installation and operation of an air driven hydraulic pump is given in illustrated Data Sheet 36. Tells how pump is designed to meet demand for small volume capacity at low and high pressures, and develops up to 30,000 psi at 90 psi air supply. Tells how it affords economy of operation for testing tubing, other applications. The Aldrich Pump Co.

136 **Water Jet Eductors**—Bulletin 2-M, 36-pp, discusses in detail standard and special SK water jet eductors, used in lifting, pumping, mixing and agitating of liquids, in handling of solids and slurries, and in such operations as draining flooded cellars, pumping and mixing in oil treating systems. Included is comprehensive information on design, construction, application and operation, methods of pumping and moving liquids and handling solids. Includes a Nomograph which helps a plant engineer determine whether a special eductor might be applicable where a standard one will not do the job. Schutte and Koerting Co.

CONSTRUCTION

137 **Roofing Accessories**—Four newly-designed aluminum roofing accessories for protecting the vulnerable joint between roof and wall are introduced in this 16-pp bulletin. Presents advantages of aluminum copings and gravel stops and describes an extruded gravel stop, combining cant strip and fascia band; a gravel stop which forms an integral stop; and copings for parapet walls. Includes full specifications, charts, graphs, diagrams, and installation details. Performance records of aluminum products in salt spray and atmospheric exposure tests are given. Aluminum Co. of America.

138 **Floor Tile**—This 34-pp digest on resilient floor tile products and services is well illustrated with photos—some in color—of actual installations. They include asphalt floor tile, greaseproof industrial floor tile and floorings, greaseproof resilient floor tile, vinyl plastic asbestos floor tiles, also wall tiles, underlayments and adhesives, and maintenance products. Tile-Tex Div., The Flintkote Co.

139 **Mobile Fire Walls**—This bulletin points out the advantages of company's Mobil fire walls. Describes three of the products designed for stopping the spread of fire within a building; fire doors, fire partitions, and non-combustible interior partitions, and presents test requirements. Virginia Metal Products Corp.

140 **Automatic Doors**—This 7-pp booklet describes company's Prest-O-Matic Doors for industrial use—automatic, electrically-operated doors furnished in completely packaged units consisting of the doors, motor, and operating mechanism, together with all hardware and component parts. Points out chief features and includes installation tips. Clark Door Co.

FANS, BLOWERS

141 **Quiet Operating Fan**—Bulletin CTB-103, 12-pp, covers in detail company's Turbo-Pressure blowers, designed to furnish air at high pressures for use with oil and gas burners on industrial furnaces for penumatic systems, and other applications. Well-illustrated, it contains necessary charts and specifications for this type of fan. Chicago Blower Corp.

142 **Industrial Exhaust Fans**—Twenty-pp Catalog 500-B describes exhaust fans for use in connection with pneumatic conveying systems handling many kinds of bulk materials. Covers various applications, types and construction. Complete dimensional data and capacity tables are provided. Principles of application and engineering data for standard and long-cone cyclone separators are described and illustrated. Fort Worth Steel and Machinery Co.

143 **Centrifugal Blowers, Exhausters**—Twelve-page Bulletin M-103 describes company's blowers and exhausters for applications requiring air pressure from 1 to 9 psi, or vacuum from 2 to 12 in. of mercury. Discusses design, types and advantages of the models and contains several charts showing capacity ranges of both blowers, exhausters. Air Appliance Div. U. S. Hoffman Machinery Corp.

HEATING

144 **Heating Units**—Catalog 703, 24-pp, contains detailed descriptions, photos, specifications, construction and application information on company's line of convectors. Floor, wall, front outlet wall, recessed and partially recessed cabinets plus sloping top models, are described with their accessories. Tables and charts show capacities. Airtherm Mfg. Co.

145 **Hot Water Heating**—Bulletin 1551, 16-pp, contains photos, application drawings and all necessary catalog information on the company's line of hot water equipment including circulators, valves, fittings, specialties and controls. C. A. Dunnam Co.

Among Recently Published Literature of Merit . . .

146 **Sound Control**—Illustrated Design Data AC, 6.A1, 32-pp, is organized to provide plant engineers with complete data reference on Fiberglas sound control products and installation systems. Selection guide covers products with condensed description and data on usage, installation, standard sizes, relative cost and noise reduction, fire resistance and light reflection qualities. Each product and installation system is treated in greater detail in individual sections. Illustrations supplement text on variety of installation systems that can be used with Fiberglas products. Owens-Corning Fiberglas Corp.

147 **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

148 **Heat Exchangers**—A description of stock and specially engineered fixed tube bundle heat exchangers is given in newly revised 12-pp Catalog 1254. Contains application photos covering a wide range of industries and includes materials and construction features, dimensions drawings and tables. Approximately 4-pp are devoted to a guide to heat exchanger selection. This data includes tables and formulas for selecting exchangers involving most common cases of water-to-water and water-to-oil heat transfer. Young Radiator Co.

149 **Pneumatic Handling System**—Of value to plant engineers concerned with handling of dry pulverized materials, 16-pp Bulletin G-2 tells how handling costs can be reduced by using the proper pneumatic handling system. Lists 86 dry pulverized materials and indicates which of three systems is best suited to handle each material. Discusses company's system for conveying such materials as Portland cement, pulverized coal, limestone dust, fly ash, pulverized phosphate rock, and others. Presents advantages of Airveyor and Airslide systems. Fuller Co.

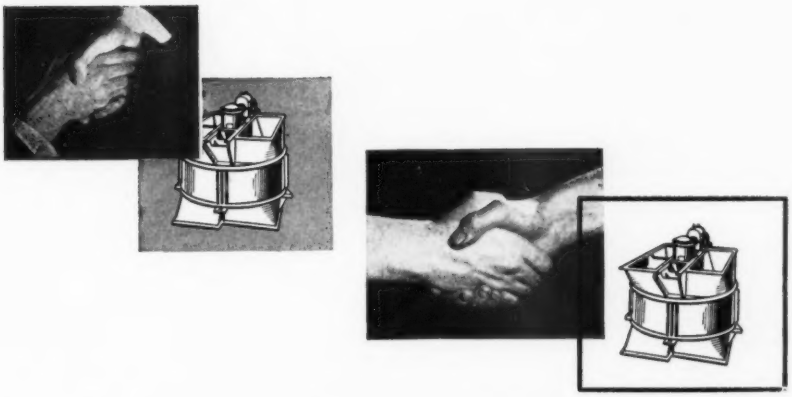
150 **Mastic Coating Guide**—An illustrated discussion of various types of asphaltic mastic protective coating for use on masonry, brick and concrete side-walls, roofs, storage tanks and process equipment is presented in this bulletin. Chart listing types of mastic coatings designed to meet different industrial specifications and conditions of service is included, also recommendations for mastics to be used on interior and exterior structural surfaces and on special equipment. Text also summarizes steps to follow in selecting and applying mastics. Emjay Maintenance Engineers.

METALS

151 **Design Sheets on Aluminum**—Now available to plant engineers is "Designing with Aluminum," a set of seven design sheets in attractive file folder. They cover thermal conductivity and reflectivity; electrical characteristics; corrosion resistance; strength; thermal treatments; other subjects. One sheet is devoted to use of aluminum for ducts. Kaiser Aluminum & Chemical Sales, Inc.

152 **Cast Stainless Alloys**—A series of 13 individual data sheets covering properties of popular grades of alloys used for corrosion resistant (stainless steel) castings is featured in this 26-pp booklet. Each data sheet lists chemical compositions, physical and mechanical properties, and includes a discussion of design considerations. Alloys are described with respect to metallurgical structure and characteristics, and preferred heat treatments recommended. Alloy Casting Institute.

(More Bulletins on page 197)



Why your Ljungstroms are so efficient

—year after year

Air Preheater Corporation Field Engineers aim to visit every Ljungstrom Air Preheater in this country at least once a year. Their main objective is to increase availability and assure you a maximum return on your investment. They are always available for consultation.

This is just another reason why the Ljungstrom Air Preheater is *the most economical heating surface on the modern boiler.*

THE AIR PREHEATER CORPORATION

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RECOMMENDED WHERE:

1. Seeing tasks demand 25 footcandles or more.
2. Walls, ceilings, machinery, etc., have good reflectance.
3. You need *super-comfortable* illumination.
4. Maintenance costs are important.
5. *Best* lighting is required at *reasonable* cost.

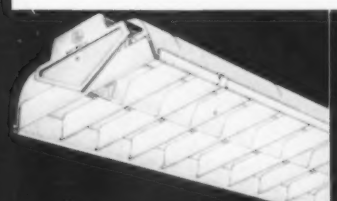
THE REVOLUTIONARY NEW LIFETIME

CFI-25

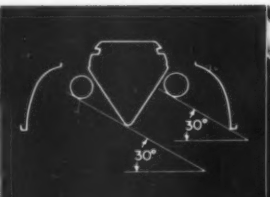
WITH 25% UPWARD COMPONENT

The CFI-25 is more than a new fixture. It is the beginning of a new era of super-comfortable industrial lighting. For the first time, the CFI-25 makes available a rugged, premium quality industrial fixture with all the comfort advantages of 25% uplighting—*within a practical price range!*

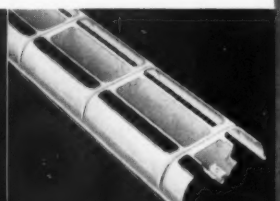
See this sensational new development. Compare it—feature for feature—with any other industrial fixture on the market. Notice the full 8-foot, one-piece, porcelain enameled reflectors... the new "bridge-type" ribbed construction... super-comfortable shielding... the many, many features that make the CFI-25 the most modern product in its field. Available for 8 ft. Slimline, 4 ft. Rapid Start and the newly developed 8 ft. High-Output Rapid Start lamps.



20° LENGTHWISE SHIELDING. Optional louver assembly provides excellent visual comfort. Louvers furnished in 4-ft. sections, hinge either side for easy servicing.



30° CROSSWISE SHIELDING. Porcelain reflector provides comfortable 30° crosswise shielding, adds substantial strength and rigidity to the fixture.



NEW RIBBED CONSTRUCTION. Reflectors reinforced by die-embossed ribs between apertures. Ribs add lateral stability, prevent spreading, maintain straight fixture edges.

IMPORTANT!

Here's why *only*

PORCELAIN ENAMEL

is used for CFI reflectors!

An industrial lighting fixture is no better than the wearing qualities of its reflecting surfaces. The lasting qualities of baked enamel reflectors are questionable in industrial applications. *Only porcelain enamel guarantees a lifetime of service at the least cost.*

Porcelain enamel does not decay or change with age because it is *inorganic*—nothing but rock-like minerals that are actually melted and fused to the base metal under extremely high temperature (1400-1600°). The result is a

CFI MEANS COMFORT FOR

SEE YOUR ELECTRICAL CONTRACTOR FOR THE COMPLETE

THE NEW DAY-BRITE LIFETIME INDUSTRIAL SERIES— ONLY INDUSTRIALS WITH FULL 8-FOOT, ONE-PIECE, PORCELAIN ENAMELED REFLECTORS

THE LIFETIME

CFI-10

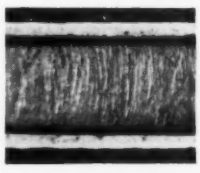
WITH 10% UPWARD COMPONENT

Sets a new high standard for industrial lighting fixtures! 10% uplighting reduces glare and lessens brightness contrasts. Full 8-foot, one-piece, porcelain enameled reflectors featuring new super-rigid ribbed construction. Runs line up perfectly, *stay perfect.* Available for 8 ft. Slimline, 4 ft. Rapid Start and the newly developed 8 ft. High-Output Rapid Start lamps. Engineered and built to give a *lifetime of service.*

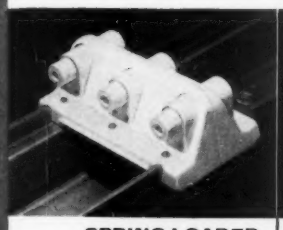
flint-hard, indestructible bond of metal and finish that is unaffected by time, heat, moisture and other harmful elements.

No baked enamel finish can assure you the non-yellowing, noncorrosive reflection surface that porcelain enamel does. There are no tiny surface pores in porcelain enamel. Any dirt or stain is external and is easily wiped away.

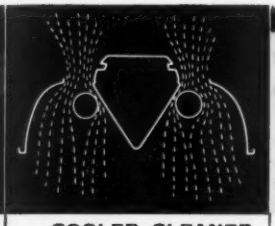
Because of its undisputed superiority, specially formulated porcelain enamel with a reflector factor of 85% or more is the one and only finish Day-Brite uses on the reflection surfaces of the CFI-25 and the CFI-10 ... to make them in fact — as well as in name — a *Lifetime* industrial lighting value.



Microphoto shows how metal and porcelain enamel fuse together to form lifetime bond.



SPRING-LOADED SOCKETS. Firm lamp contact, firm seating. Metal clad for positive alignment and protection against breakage. Individually replaceable.



COOLER, CLEANER OPERATION. Diagram demonstrates "up-draft" action through apertures. Constant flow of air keeps dust from settling, reduces operating temperature.

FAST, SIMPLE MAINTENANCE. Reflectors on or off in seconds, fasten to channel by hand-operated 2" wing-nuts. Porcelain enamel wipes clean quickly, is noncorrosive.

INDUSTRY!

DAY-BRITE QUALITY STORY

For more facts circle 520 on Reply Card

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

4107

UCON
Trade-Mark
FLUIDS AND LUBRICANTS
the
NEW
answer to
IHD
problems
in
...COMPRESSORS
...VACUUM PUMPS
...POWER RECOVERY ENGINES

UCON synthetic fluids and lubricants have these unusual, built-in properties that offer a new approach to lubrication in processes that involve air, hydrogen, nitrogen, hydrocarbons, or combustion gases:

- Non-carbonizing
- Sulfur-free, wax-free
- Water-soluble and water-insoluble series available
- Unusual solvent action on gums and contaminants
- Low stable pour points
- High viscosity indexes
- Solvent power for petroleum-oil residues
- Excellent lubricity
- No harmful effects on gaskets and seals
- Non-corrosive to metals
- Non-toxic

Write today for complete information on UCON *fluids and lubricants.*

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30 East 42nd Street, New York 17, N. Y.
UCC
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For more facts circle 521 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Pat on the Editorial Back

PLANT ENGINEERING:

"We wish to compliment the editorial staff for the excellent manner in which the article 'Maintenance Storage' was handled.

"This article has had very good reaction within our plants, and we have heard good comments from people employed in other plants in and around Cincinnati." *Dale A. Jordan, Supervisor of Equipment Maintenance, The Cincinnati Milling Machine Co., Cincinnati, O.*

Conveyor Article Interesting

PLANT ENGINEERING:

"Would you please supply us with two sets of tear sheets, pages 134 to 140 of the September, 1954 issue of PLANT ENGINEERING.

"These sheets cover the article 'Conveyors Do the Darndest Things.' This is one of the best presented and most interesting articles on this subject that I have ever read." *W. J. Elvin, Project Engineer, Mechanical Development Section, Celanese Corporation of America, Charlotte, North Carolina.*

▶ After those kind words how can we refuse? Two sets of tear sheets of this article are being sent to you with our compliments.—*Editors.*

PE and a Hundred Others

PLANT ENGINEERING:

"I appreciate the permission granted us to reproduce your contents page. Even more, I appreciate your courtesy in sending me a copy of the tear sheet of 'Round About' in which you give our system a favorable review.

"You may be interested to know that over a hundred publishers have given us similar permission and that our initial experience with the system on an experimental basis indicates it has improved the value of our journal routing system for our users." *G. E. Randall, Manager, Technical Information Branch, ARO, Inc., Tullahoma, Tennessee.*

Safe Loading Platforms

PLANT ENGINEERING:

"The articles in the July, 1954, issue on 'Tank Truck and Tank Car Loading' were of particular interest to us. We have experienced, in our operation, that in furnishing larger equipment in rolling stock, our loading rack is now too low to be safe with the existing walkways, and that the solutions offered by Messrs. Turner and Kemp are just what we need to bring our plant loading facility to a good safe level.

"We have consulted with our local welding contractor who requested that we attempt to get a copy of the working drawings for these units. Could you assist us in getting the information from the gentlemen who originated these units? In the event you can forward this request for me, I would like first to convey my thanks to these gentlemen and second to provide the funds required to fill the request." *J. J. Morrell, Plant Superintendent, Shell Oil Co., St. Joseph, Michigan.*

▶ We are sending you two photostats of the drawings of the tank truck and tank car loading platforms. We hope that these prints will be of help to you in constructing equally safe loading platform facilities for your plant.—*Editors.*

Western Conference Papers

PLANT ENGINEERING:

"In reading the September issue of PLANT ENGINEERING, I find a number of abstracts from papers presented at the Western Plant Maintenance Conference and Show which are of great interest to us. We are planning an Industrial Plant Maintenance Institute next February or March and would like to use this information to help develop possible subjects.

"Would it be possible for you to send copies of the following papers: (1) Maintenance Problems in Small Plants; (2) Training Program; (3) Pointers on the Care of Electrical and Lighting Equipment; (4) Maintenance of Electric Motors and Controls; and (5) Maintenance in Metal-Working Plants.

"If you do not have copies of these talks, would you please give us complete mailing addresses of the speakers so we may contact them for the information." *R. D. Smith, Institute Coordinator, The University of Wisconsin, University Extension Division, Madison, Wisconsin.*

▶ We are happy to make our file copies of these papers available for your use. —*Editors.*

PE Editor Braves the West

PLANT ENGINEERING:

"In my experiences the consensus of opinion in the East is that if you should go beyond the city limits of any town out West you stood a good chance of getting scalped by the Indians, even today.

"It is refreshing to know that your editorial director, Dick Morris, is not one of the above belief and that he has such a high regard for some of the engineers in this area.

"Our plant engineer, Jim Weeks, kept us well informed on the developments leading up to and during the recent Western Plant Maintenance Conference. It is also gratifying to know that much progress has been made in organizing a group out here composed of plant engineers who are specifically concerned with

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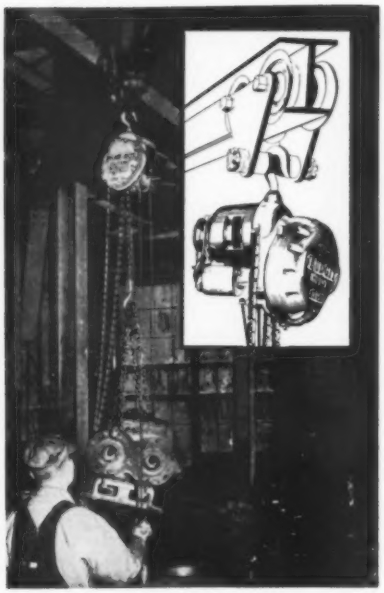

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BACKTALK

plant engineering problems, etc. Certainly the occasions afforded to those in this area to get together and to exchange ideas and experiences can only result in progress.

"I also am sure that such sections as the reprint you sent to me should create and sustain the interest of plant engineers to give your publication greater consideration as time goes on." *A. L. Hawley, Works Manager, Plomb Tool Co., Los Angeles, California.*

Lost: May 1954 Copy of PE

PLANT ENGINEERING:

"My copy of your May, 1954 issue is missing. Its loss was discovered when I wished to refer to your article 'How to Use Test Data to Calculate Cooling Tower Performance.'

"Can you send me a reprint or a tear sheet of this article? It would be greatly appreciated." *R. W. Canfield, Vice President, Clemson Bros., Inc., Middletown, New York.*

▶ We are sending you a set of tear sheets on this article and also an additional copy of the May, 1954 issue of PLANT ENGINEERING to replace the missing copy.—*Editors.*

Reprint of Construction Briefs

PLANT ENGINEERING:

"Enclosed is my check for 50 cents for the copy of the six article reprint of the 'Construction Briefs' series.

"I think it was a very excellent idea to bind these articles, and I certainly want to get the next series when they are available. To me they should prove valuable as a reference source." *C. M. Haas, Chief Engineer, Bethlehem Steel Co., Williamsport, Pennsylvania.*

PLANT ENGINEERING:

"Thank you for sending me the reprint of the first six articles of the 'Construction Briefs' series.

"I would greatly appreciate notification as to the date when you will make your second reprint of the same series. I find the articles of help as they condense and simplify past work learned in college." *David H. Miller, Rosiclare, Illinois.*

▶ Reprints of this set of six articles on "Construction Briefs" are available at 50 cents per reprint. Any readers interested in receiving this reprint should address their requests to The Editor, PLANT ENGINEERING, 110 South Dearborn St., Chicago 3, Illinois.—*Editors.*

Article Reprint Available

PLANT ENGINEERING:

"I have just finished reading 'Temperature Rise in Motors and What It Means,' by Tom M. Gayle, consulting engineer, in the June, 1954 issue.

"Since this article contains much timely, valuable information, I would like to know if it is possible to obtain about 50 copies of this article.

"Would you kindly advise if 50 copies are available and what the cost would be? Thanks for your help in this matter." *J. W. Sullivan, Manager Eastern Division, U. S. Electrical Motors, Inc., Milford, Connecticut.*

▶ Because of the number of requests for this article, we are having it reprinted. As soon as the reprints are available they will be sent to you. If other readers are interested in having a reprint of Mr. Gayle's article, kindly indicate this on the postcard in this issue. Cost per reprint is 15 cents.—*Editors.*

Article to Appear in Pamphlet

PLANT ENGINEERING:

"Your November, 1953 issue, page 99, carried a story by our Mr. A. L. Williams, entitled 'Trolley Weight Decreased —Pay Load Increased.'

"We are considering reprinting this article in a small pamphlet and would appreciate receiving your permission to do so. A credit line will be included, of course." *George J. Newhams, Advertising Manager, Engineering Works Division, Dravo Corp., Neville Island, Pittsburgh, Pennsylvania.*

Industrial Lighting Reprints

PLANT ENGINEERING:

"Thank you very much for the 'Industrial Lighting' reprint of the series of lighting which appeared in PLANT ENGINEERING over the past year.

"This is an excellent series of articles and should prove quite useful to us as a reference." *J. D. Dexter, Assistant Chief Engineer, Mersey Paper Co., Ltd., Liverpool, Nova Scotia.*

▶ Readers interested in receiving a copy of this 48-page reprint of the series on "Industrial Lighting" should address their requests to The Editor, PLANT ENGINEERING, 110 South Dearborn St., Chicago 3, Ill. Charge per reprint is $1.00.—*Editors.*

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"Here's where we can't go wrong," I told John

John is my partner in a small manufacturing enterprise we started six years ago. Recently we decided to build a new plant that would give us added space and the most modern facilities. There were a lot of hard decisions to make because we just haven't enough money to afford mistakes, even little ones.

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The cost of quality coal to meet our most exacting requirements should be substantially less than that of any other fuel.

With modern stoker and coal and ash handling equipment, our steam costs should be reduced to a minimum.

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We figured, too, that if companies many times our size are burning coal – and for the same reasons – we can't go wrong.

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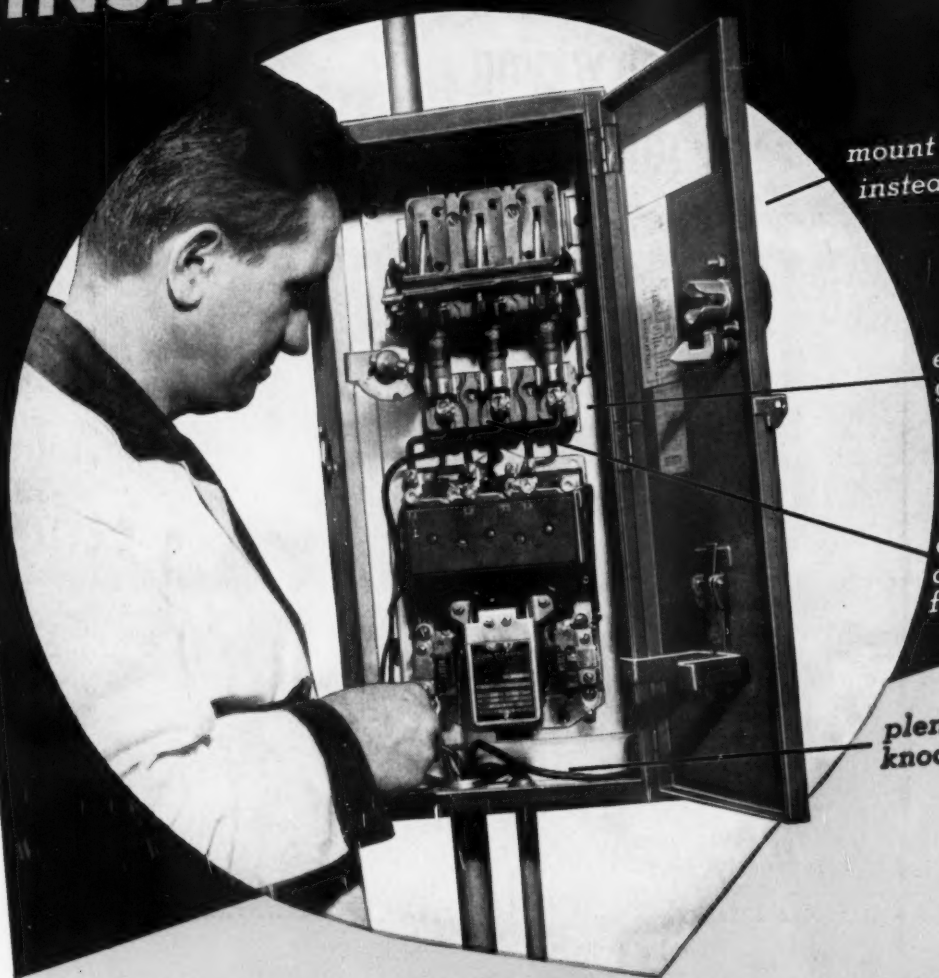

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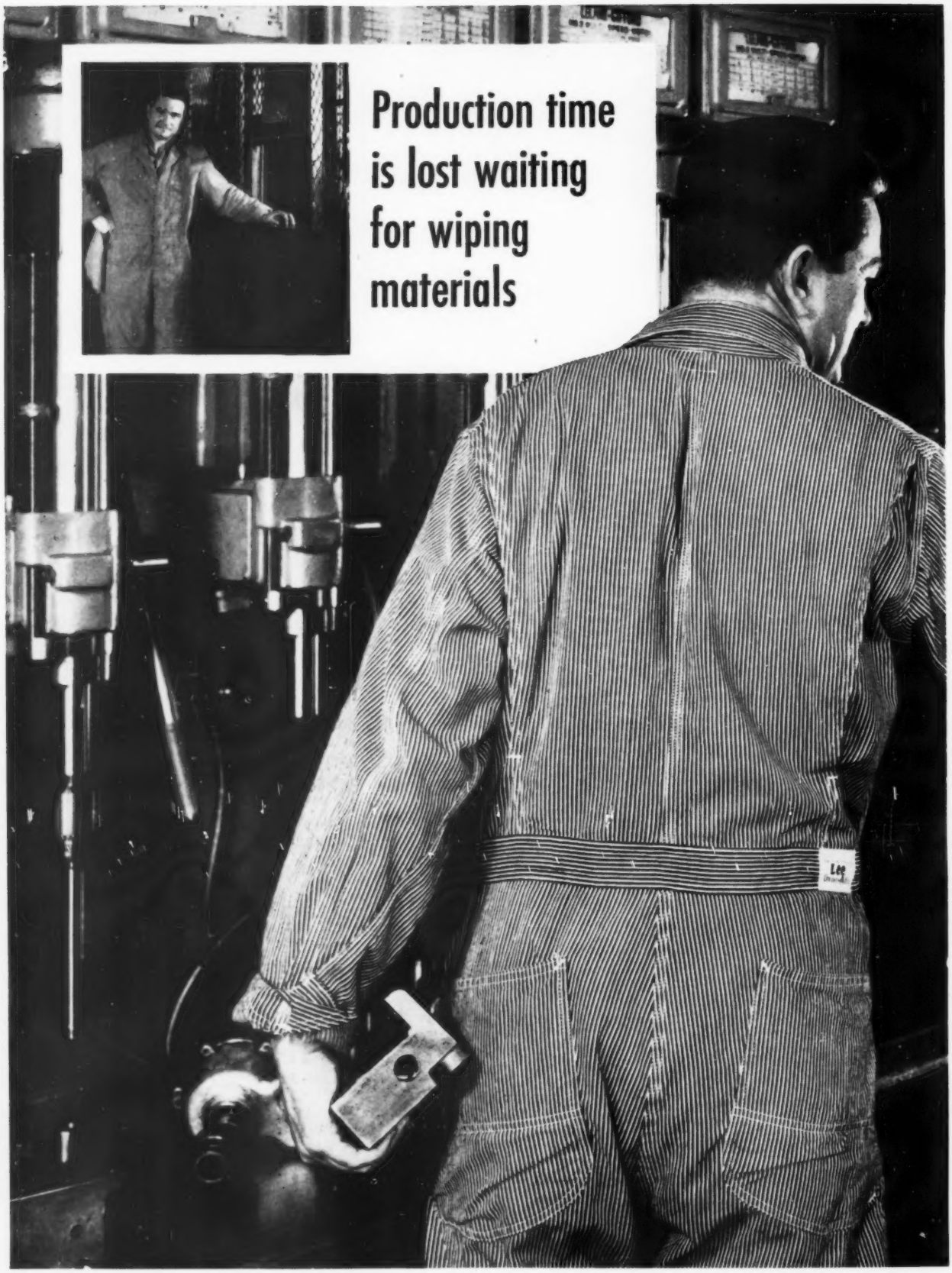
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materials

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Instead of having to leave the job to get clean wiping material, workers keep a box of Scott Wipers next to them all day long. This simplified system of distribution and control saves valuable production hours.

Scott Wipers are sanitary, disposable. They end the laundering problem . . . greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials.

They are soft and absorbent, yet each Scott Wiper is two-ply and tough.

Whatever you're using now—compare them with Scott Wipers for cost, convenience, performance.

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by M. E. Weissman

Special Hopper Handles Coke

MANUFACTURE of carbureted water gas presented a coke handling problem to the Paterson, N. J., plant of the Public Service Electric and Gas Company.

Main operation at the plant consists of charging four water-gas generators with coke at intervals varying from one-half hour to one hour. The coke must be carried from the storage yard to the generator stations which are located about 25 ft above yard level, on the second floor of the generator building. The stations are reached by an elevator.

The operation had always been performed by dump hoppers which were carried on rider type industrial trucks from the storage yard to the charging stations, via the elevators. The weight of the truck and the limitation of the carrying capacity of the elevator made it impossible to carry a full load of 3000 lb. As production of the plant grew, the problem became acute.

Loads of coke are trucked, via elevator, in a specially designed steel hopper

The solution was to build lightweight dump hoppers and to mount them on walkie type, battery powered trucks. The hoppers were constructed entirely of welded steel, mounted on steel frames, and were fitted with modified hydraulic lift mechanisms for pivoting. Each unit has a capacity of 3000 lb and is driven by a 10-cell battery.

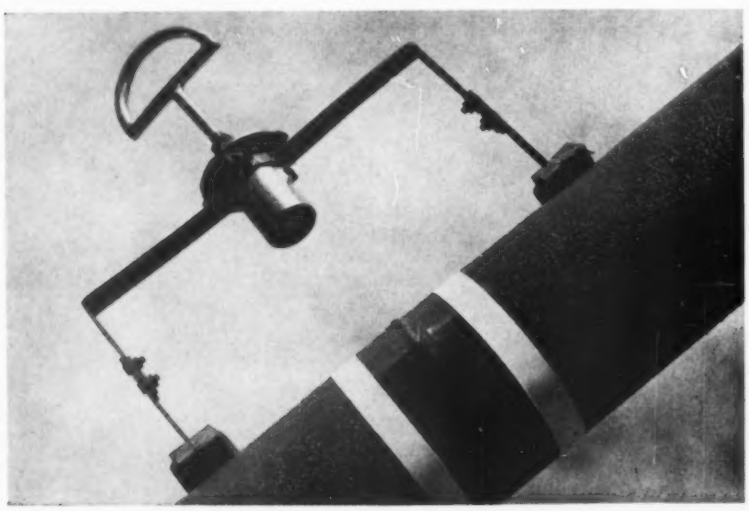
The hoppers are loaded either from storage bins or from directly beneath a railway siding at which the coke is received. They are unloaded by positioning the discharge end over the generator opening, tilting and allowing the coke to gravity feed into the generator through a specially constructed drop door. *From Storage Battery Power, published by Edison Storage Battery Div., Thomas A. Edison, Inc., West Orange, N. J.*

Weld Inspection by Gamma Ray Photograph

INSPECTION OF WELDS by means of photographs made on the job by gamma rays, is giving good results at a construction site at Stockton-on-Tees, England. The inspection unit consists of a small, portable holder containing an iridium isotope in a tungsten and lead-lined cylinder. The feet of the holder are magnetized when the subject of the inspection is magnetic. Where the material is nonmagnetic, the feet of the holder are strapped in position.

The gamma ray photograph is taken by placing a film negative between two lead screens on the underside of the pipe or flat weld requiring inspection.

This method has been used successfully on work in congested areas for which standard x-ray equipment would be too large, and on work which is especially suitable for gammagraphical inspection. *From Target, published by British Information Services, New York, N.Y.*



Unit containing isotope of iridium makes on-the-job inspection of piping weld

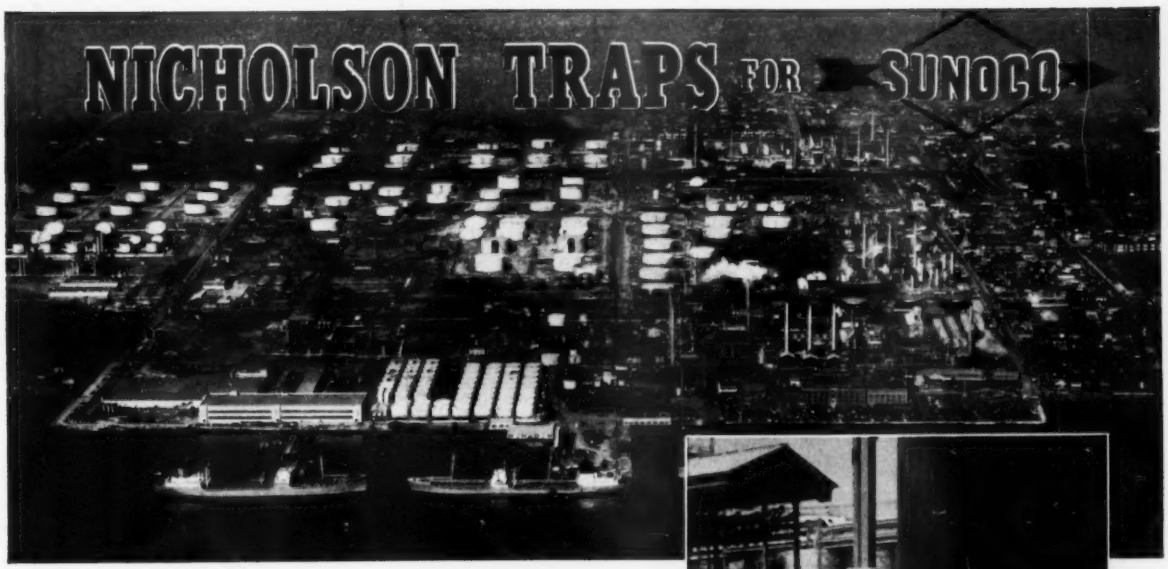
Rouge Waste Disposal

WASTES FROM the manufacture of optical glass, particularly those from the polishing processes, contain large amounts of very finely divided iron and a considerable quantity of glass, many particles of which are microscopic in size. The iron, which comes from the polishing rouge, together with detergents used, form a quasi emulsion, turbid and high in color, which presents problems of treatment and disposal.

Because of their emulsion-like nature, the wastes can not be settled; sedimentation periods up to two weeks have no apparent effect. Biological treatment is useless since the ratio of organic matter to total solids is extremely low. Therefore, chemical coagulation seemed to offer the best solution to this problem of disposing of rouge wastes.

Wastes from an Eastern plant was alkaline and acid treatment failed to break the emulsions. Alum proved completely useless, while lime gave a fair reduction in suspended solids, but did not sufficiently reduce the characteristic red color. Iron salts, especially ferrous sulphate, gave similar results to those of lime.

Experience had shown calcium chloride to be an effective coagulant for alkaline wastes containing soap or other detergents, and trials with rouge wastes showed that calcium chloride effected a more satisfactory removal of suspended solids than other coagulants. It was equally satisfactory in the removal of iron. Most



Air view of Sun Oil Company's refinery at Marcus Hook, Penna.

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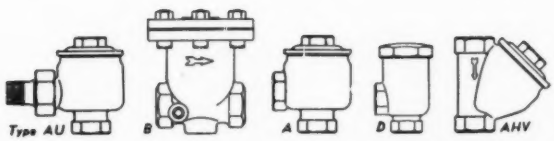
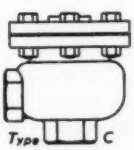
Feature





SIX TYPES FOR PROCESS, HEAT AND POWER -- Construction of bronze, semisteel or cast steel. In sizes of ¼" to 2" for pressures to 300 lbs. All six types of traps have stainless steel valves and seats. Bellows are furnished in bronze, monel or stainless steel.

Nicholson steam traps are shown above installed on storage tanks requiring heating at Sun Oil Company's Marcus Hook, Pa., refinery. Sun has standardized on this type of installation.

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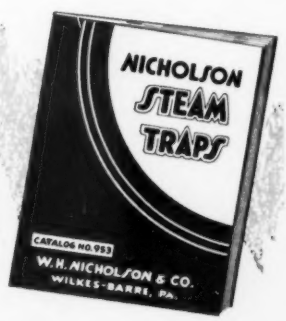

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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

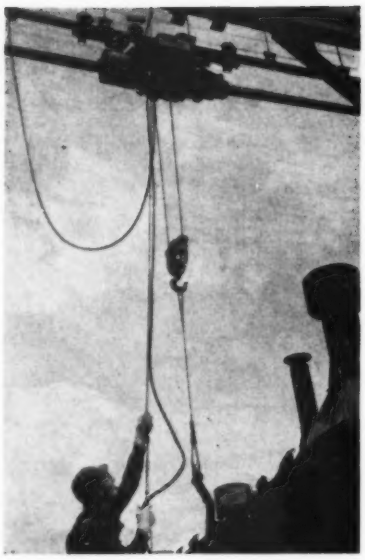
important, it removed all traces of reddish tinge.

Amount of calcium chloride needed was not critical. Trials showed that 250 ppm, or about 2 lb per 1000 gal, gave satisfactory results. The sludge settled rapidly and its volume was small. The supernatant was clear and practically free from caustic alkalinity. *From Sanitalk, published by Massachusetts Dept. of Public Health.*

Brake for Monorail Crane

IN ORDER TO CLEAN all four faces of a "bloom" of its scales and impurities, the heavy square steel bar has to be flipped over. This maneuver is carried out with a pair of tongs attached by cable to a 1000-lb crane sliding along a single rail. Frequently, the hand-dragged crane moves too far forward or backward, trailing the worker with it. He has to use all his strength to stop the crane, and sometimes he is hit by the bloom.

A simple brake, designed by Richard Snider and constructed of valve springs from an old automobile and scrap iron, prevents such accidents. Mounted on the crane, the brake consists of the two springs which force a brake lining, 18 in. by 3 in., against the rail. A lever is attached to one end of the device; the other end is fitted with a hinge so that it can be moved up and down easily.



Safety brake, white arrow, on monorail crane is activated by lever, black arrow

When the operator wants to release the brake to enable him to move the crane, he pulls on a chain attached to the lever, which in turn, draws the brake lining away from the rail. To stop the crane, he releases the chain. *From CF & I Blast, published by Colorado Fuel and Iron Corp., Pueblo.*

Liquid CO_2 as Coolant

IT HAS BEEN KNOWN for many years that in some machining operations, notably lathe turning, a tool would last longer if the cutting edge were cooled sufficiently. It has also been known for some time that the application of liquid carbon dioxide would provide the necessary degree of cooling if it could be correctly applied.

Early methods of application were not completely successful because the jets of liquid carbon dioxide were directed toward the tool cutting surfaces. The snow which formed brought about excessive cooling. This proved advantageous in some work, allowing higher rates of machining and giving increased tool life, but it was realized that a new technique would have to be developed in order to gain full advantage from this method of cooling.

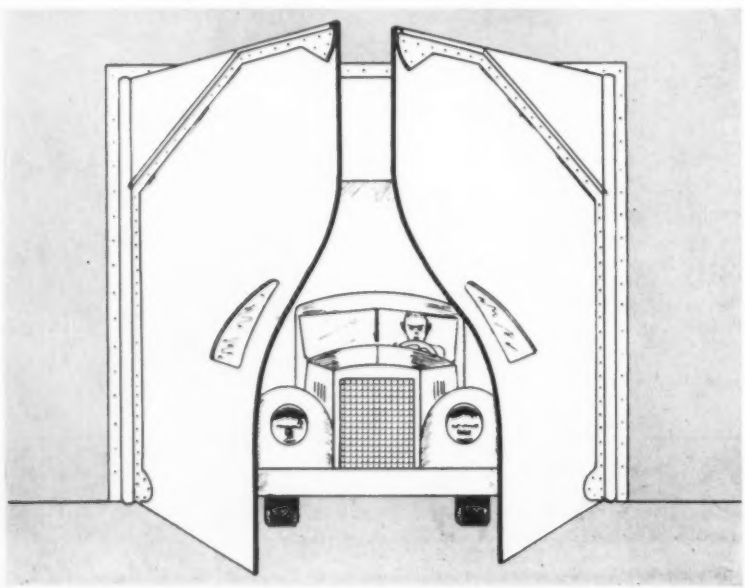
Subsequent experiments by the Car-

(Continued on page 40)

Rubber Crash Doors Give Way for Trucks and Cars; Add to Plant Safety

FLEXIBLE SWING doors which respond easily and noiselessly to the impact of a truck, trolley, car, or push from a person's hand, are now being used in plants.

Although differing slightly in design, all the rubber crash doors are identical in principle, consisting essentially of a panel of durable rubber, reinforced with suitable fabric, fixed to a metal half-frame in the shape of an inverted L. A typical panel is 5/16 in. thick. The upright frame is attached to the door post with hinges and is strengthened at the top outer corner with a metal support.

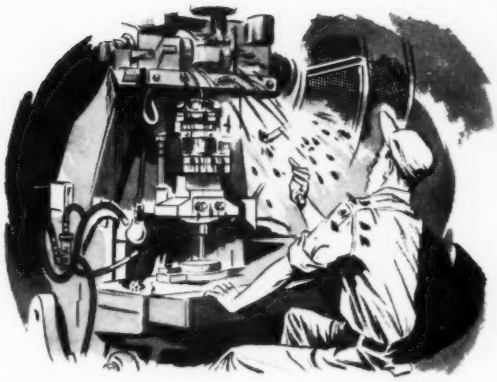


Rubber crash doors open easily, quietly, and accommodate turning vehicle

The doors close automatically by means of a spring-operated mechanism and form a draught-proof seal. All models are provided with small windows of an unbreakable transparent plastic to afford clear vision of the roadway ahead. Ability of the doors to flex enables them to cope equally well with oblique, as well as direct impact, and to accommodate a turning vehicle without difficulty.

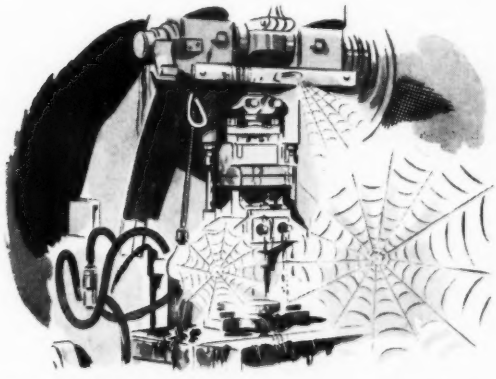
Advantages of these doors are said to include the speeding of materials handling, the reduction of draughts, and preservation of even temperatures in a working area; reduction in wear and maintenance costs, and removal of danger of injury to employees. *From Rubber Developments, published by the British Rubber Development Board, London, England.*

No Downtime in Three Years After Switching to Suntac

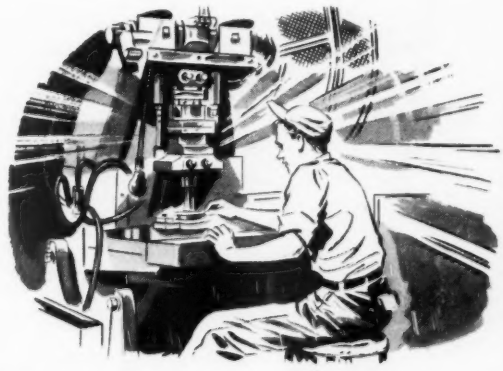


Metalworking firm was using heavy-duty stamping presses of an older type. Bearings were wearing excessively. Oil leaked constantly—on machines, floor and operators.

Lubricant loss was so severe that bearings frequently became so hot the machines had to be shut down until the bearings cooled. This cut sharply into production.



Bearings had to be replaced on an average of once every eight months. Repairs usually took four weeks, and during this time the machines as well as the floor space were completely non-productive.



Manufacturer switched to SUNTAC because it's especially compounded to cut leakage. No breakdown now for over three years. Oil consumption reduced 50%. Also using SUNTAC to lubricate other equipment.

Do you have machines with worn, leaky bearings? Or are you losing oil through excessive throw-off from rotating or sliding parts? SUNTAC is especially compounded to reduce drip, splash and squeezeout. Its greater adhesiveness makes it cling firmly to the parts it lubricates. Get all the facts about SUNTAC from your Sun Oil representative. Or write Dept. PY-11

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All Three
We do utilize all the principal vibration control media because we believe each has its place, either alone or in combination in controlling vibration problems. We don't think one product, or even one type of product can solve all vibration problems efficiently and economically.
During our half-century of experience we've come up against and solved almost every imaginable type of vibration problem. And, we've corrected enough faulty vibration control installations to know that each problem is unique in itself. There is no panacea. A single product cannot solve all problems.
So when you have a problem, bring it to Korfund — the pioneer in the field of engineered vibration control. You'll get impartial recommendations on media, whether it be springs, rubber, or cork, alone or in combination. Our experience will tell us which is best for you. And after all, there is no substitute for experience.
For your free equipment isolation Selector Chart and additional data on increasing production and reducing costs, write for your copy of Bulletin 25, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. Look under "Korfund" in your local Telephone Directory or in Thomas' Register. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-35R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St., Pierre, Montreal

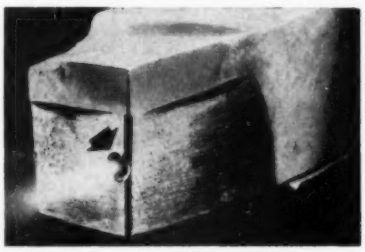
For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

bon Dioxide Company developed a technique known as CeDeCut. This method provides a reservoir of the coolant under the tool tip and prevents excess coolant discharging on the work piece.

Normally, the rate of flow of liquid carbon dioxide is controlled by



In recent method of applying liquid CO_2 coolant provides reservoir under tip

the jet, or capillary, rather than by a control between the supply and final restriction in the flow line. The reason for this is that the necessary intermediate control would involve an opening of dimensions comparable with those of the jet, and the resultant pressure drop would cause formation of solid carbon dioxide. A valve which can be fitted as a complete unit within the tool shank itself, has been designed to overcome this difficulty where desirable.

Tungsten carbide tool tips do not weaken until very high temperatures are reached. With the use of liquid carbon dioxide near the cutting edge, it is claimed that temperatures can be reduced so as to increase cutting speeds of some high tensile steels from two to four times, and to increase tool life by a similar ratio. *From Scientific Lubrication, published by Scientific Publications, Broseley, Shropshire, England.*

Magnetic Clutches for Machinery

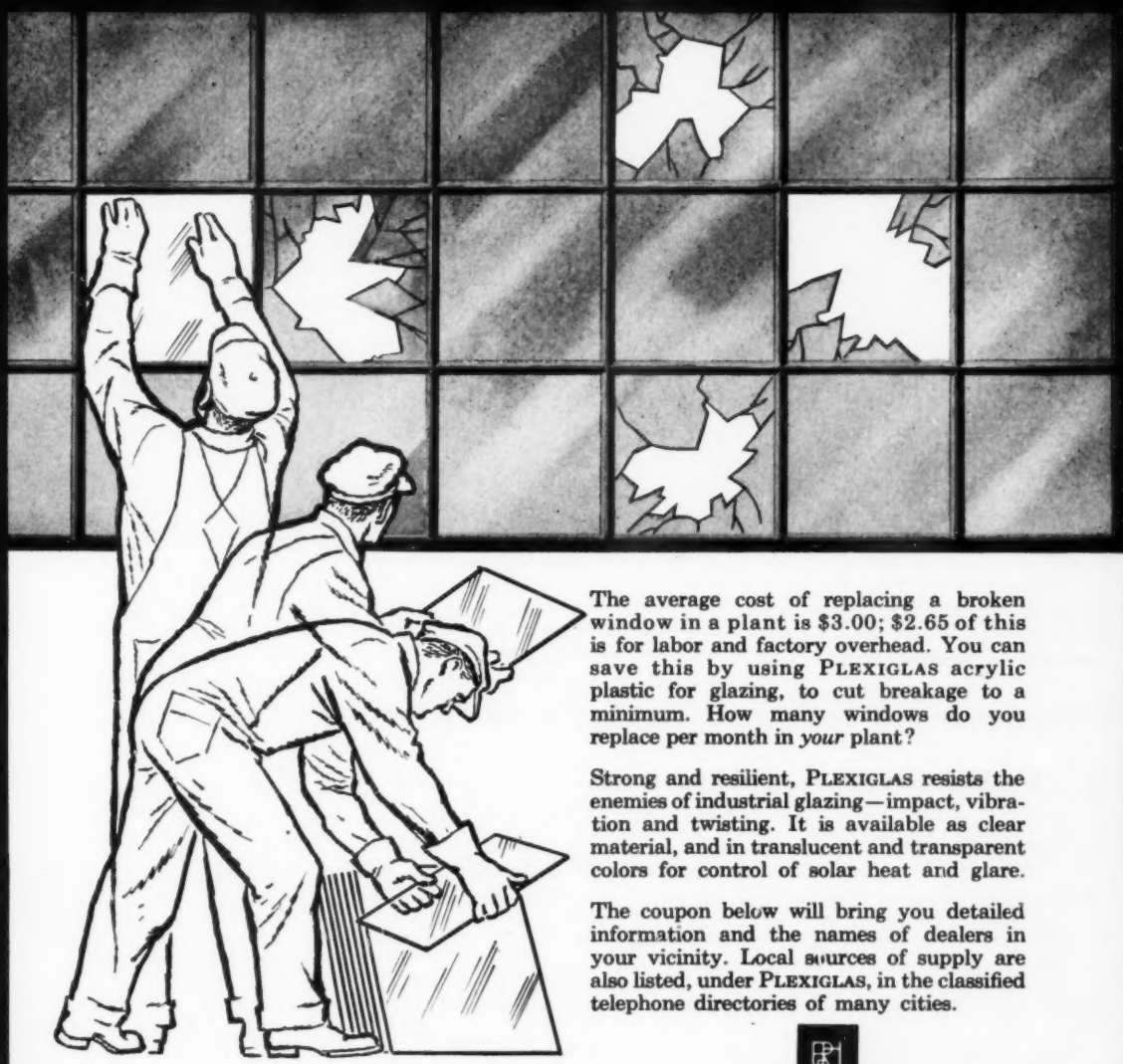
INSTALLATION of remote-controlled, electrically operated magnetic clutches in industrial machinery now eliminates unnecessary wear and damage caused by human carelessness and ineptitude.

In magnetic clutches made by Cutler-Hammer, Inc., Milwaukee, Wis., both armature and field are supported on a single hub, generally mounted on the drive shaft of the machine. The friction lining is supported between field and armature rings by a lining carrier ring having pin or plug type supports.

When deenergized, the magnet com-

For more facts circle 531 on Reply Card

Most of the cost is labor — Save it with



The average cost of replacing a broken window in a plant is $3.00; $2.65 of this is for labor and factory overhead. You can save this by using PLEXIGLAS acrylic plastic for glazing, to cut breakage to a minimum. How many windows do you replace per month in *your* plant?

Strong and resilient, PLEXIGLAS resists the enemies of industrial glazing—impact, vibration and twisting. It is available as clear material, and in translucent and transparent colors for control of solar heat and glare.

The coupon below will bring you detailed information and the names of dealers in your vicinity. Local sources of supply are also listed, under PLEXIGLAS, in the classified telephone directories of many cities.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Rohm & Haas Company
Washington Square, Philadelphia 5, Pa.

Please send me:

☐ a copy of your brochure on glazing.

☐ the names of PLEXIGLAS dealers in this area.

Name.....

Company.....

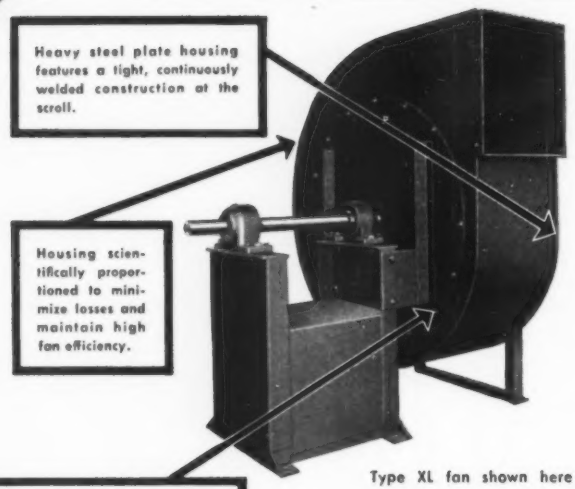
Address.....

City.....**Zone**.....**State**.....

PLEXIGLAS *is a trademark, Reg. U.S. Pat. Off. and in other principal countries in the Western Hemisphere.*

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada.

Now . . . Clarage TYPE XL Industrial Fans


Heavy steel plate housing features a tight, continuously welded construction at the scroll.
Housing scientifically proportioned to minimize losses and maintain high fan efficiency.
Adjustable to any of eight standard discharges by merely removing tap bolts on each side and rotating the housing between the sideplates.

Type XL fan shown here is typical of the smaller sizes which provide universal discharge. Larger sizes are of reinforced sheet steel and base angle construction extending to the foundation line.

Exceptional Fan Equipment distinguished by:

1. High efficiency characteristic.
2. Rugged, tight construction.
3. Three interchangeable wheels — each with radial blades.
4. Large size range — 11″ through 60″ inlet diameters.
5. Pressures to 18″ SP; volumes to 130,000 CFM.

Send for Bulletin 702 today . . .

A new, modern design offering many distinct advantages!

Clarage Type XL industrial fans are particularly well suited for diversified air and material handling applications. You'll profit from the high efficiency, in-the-field adaptability, and numerous other features of this exceptional fan equipment.

Learn more about these distinguishing features by requesting Bulletin 702, or contacting the nearest Clarage application engineering office.

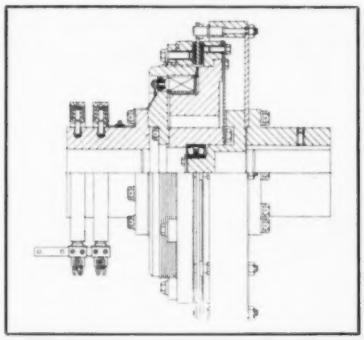
CLARAGE FAN COMPANY
Kalamazoo, Mich.

You can Rely on... CLARAGE
Headquarters for Air Handling and Conditioning Equipment
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)



Cutaway view of clutch shows bearing between magnet and lining member.

ponent of the clutch rotates independently. When energized, the armature is attracted toward the field, gripping the lining between the rings and so providing the driving torque. A roller bearing insures concentric engagement of the two parts of the clutch, and in addition, absorbs the lateral forces.

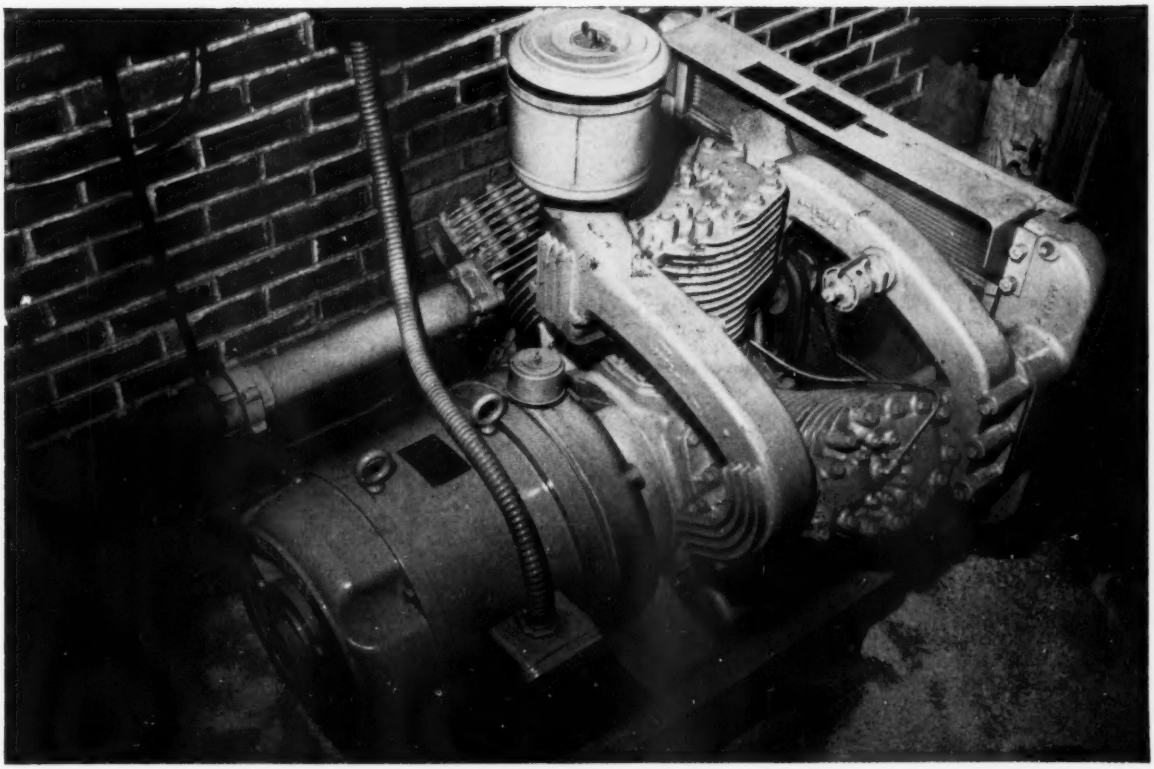
Applications where magnetic clutches have modernized machinery are in the papermaking industry, to accelerate and synchronize various sections of papermaking machines and pulp grinders; in steel mills, as a means of synchronizing mill screwdown motors, flying shears and pinch rolls; and in diesel-driven dredge pumps to accelerate the pump and slip for a short time at a predetermined torque in case of pump jamming. This prevents pump impellers from breaking and relieves engines from shock. *From the Bearing Engineer, Published by the Torrington Co., Bearings Div., Torrington, Conn.*

Increasing Life of Dies

LENGTH OF LIFE of die rings and press punches for sizing forged billets, has been increased four times by hard-facing with an alloy at Rheem Manufacturing Co., Richmond, Calif.

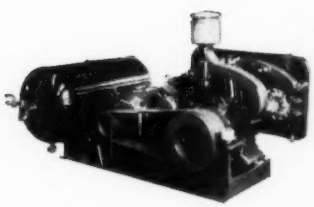
Billets, 2 ft long and 6½ in. dia, are sized after being pierced to a concentricity of 0.040 in. Before hard-facing was adopted, steel die rings used in this operation went out of size and had to be scrapped after handling 5000 forgings. Now, the rings are faced on the inside diameter with a 3/32-in. alloy deposit which makes them capable of handling about 20,000 forgings.

Hard-facing the punches has also improved the operation, since now they can size up to 13,000 billets. Previous life was 3000 forgings. An added advantage is that the punches require



SAVE ALMOST A MILE EVERY HOUR IN PISTON WEAR* WITH A JOY WL-80 COMPRESSOR—

** Piston speed is lower than that of four comparable compressors. So low that you save over 6½ miles of wear each 8-hour day.*



Joy WL-80 "Packaged Unit" Compressor can be delivered ready-to go, complete with air receivers, piping and wiring.

NEED A SMALL, COMPACT COMPRESSOR as an auxiliary air supply? Or possibly you want a compressor that can be placed right where the air is used and eliminate long runs of piping.

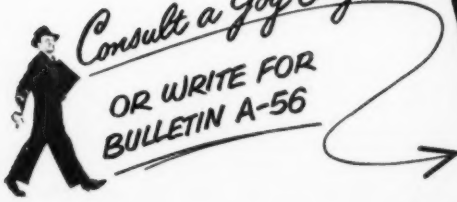
If your requirements call for 640 CFM or less, there's a Joy WL-80 for you:

- *15 to 125 HP.*
- *81 to 641 CFM.*
- *Pressures to 125 psi, standard. (High pressure units to 250 psi).*
- *Single or two stage.*
- *Air cooled.*
- *Force-feed lubrication.*
- *Eleven models.*

. . . And, you have your choice of drives: Direct, V-Belt, Flange-Mounted. In fact, these compressors are available as packaged units, like that shown at the left, delivered complete with air receivers, piping and wiring.

* * *

Get full details by writing for Bulletin A-56. ● **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



JOY

W&D 1 9377

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

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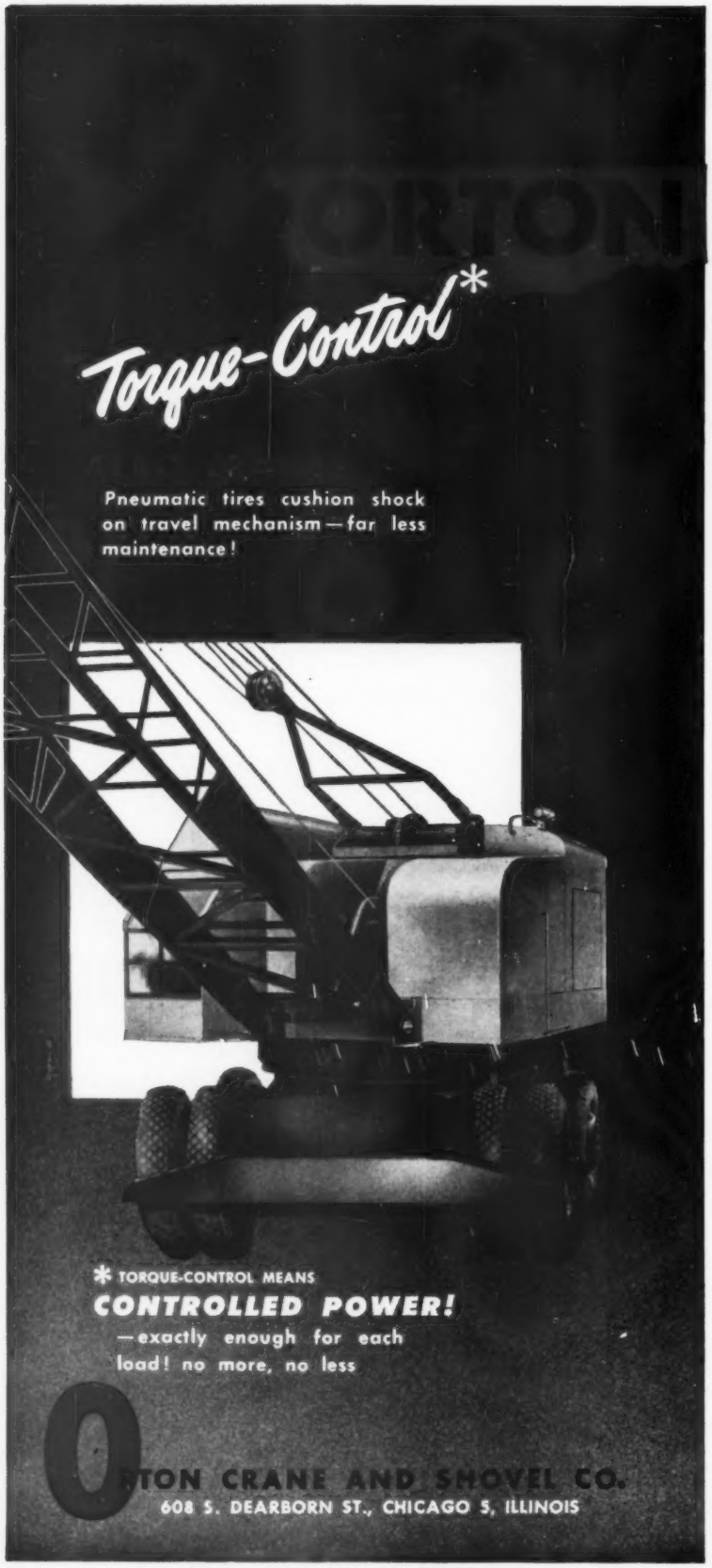
Torque-Control*
Pneumatic tires cushion shock on travel mechanism—far less maintenance!
* TORQUE-CONTROL MEANS
CONTROLLED POWER!
—exactly enough for each load! no more, no less
TON CRANE AND SHOVEL CO.
608 S. DEARBORN ST., CHICAGO 5, ILLINOIS
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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Hard-facing this punch meant four times greater production, less cleaning

one-third less cleaning when they are hard-faced. *From Haynes Alloy Digest, published by Haynes Stellite Co., Div. UCC Corp., Kokomo, Ind.*

Regular Tests Ensure Safe Fire Extinguishers

SHELLS OF FIRE extinguishers of soda-acid, foam, anti-freeze, and water-filled gas cartridge types are susceptible to weakening by age, corrosion, or mechanical damage which may cause them to burst in operation.

Regular hydrostatic pressure tests on the shells to uncover such defects, can be made in many plants.

Recommended procedure is as follows:

1. Empty the extinguisher. Remove acid bottles, inner chambers, or gas cartridges.

2. Wash the interior with clean water. Look for signs of serious corrosion.

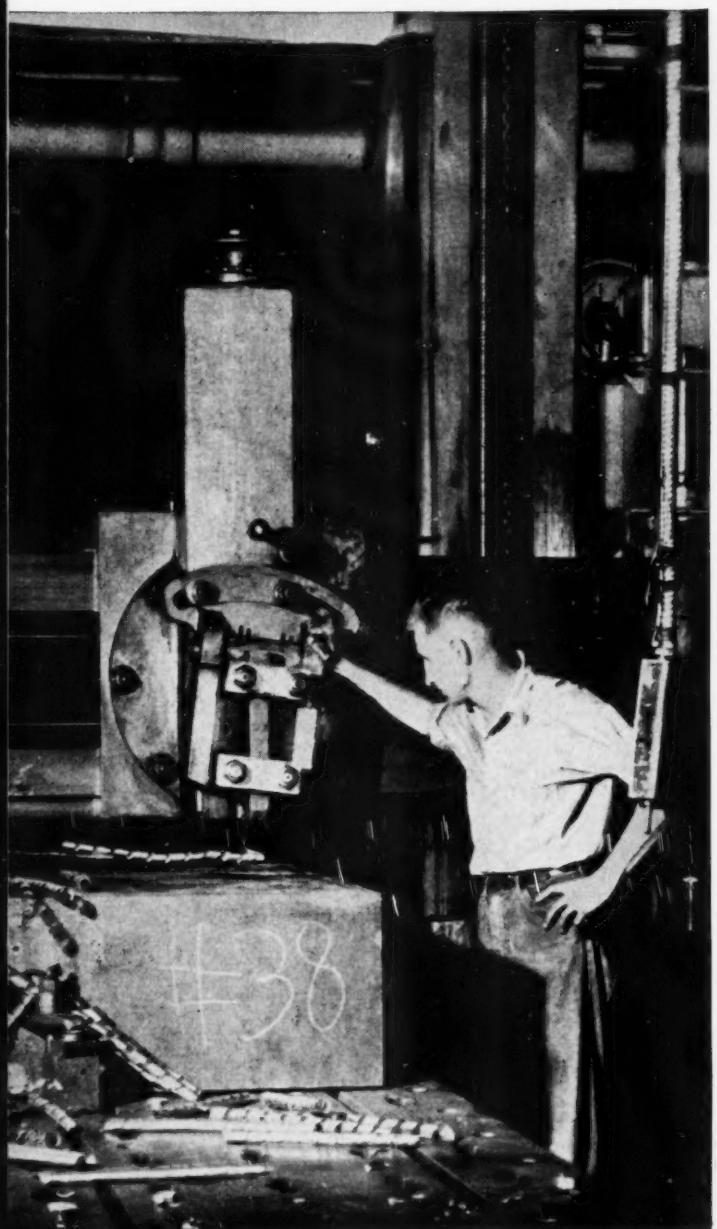
3. Connect the extinguisher to a hydrostatic pressure test pump by means of a pressure hose clamped over the extinguisher nozzle.

4. Engage the extinguisher cap loosely by one of two threads and fill the extinguisher with water until it discharges through relief holes in the cap. If there are no relief holes, allow the water to seep out between cap and collar threads.

In case of failure, any remaining air would greatly increase the violence of rupture. Therefore a substantial shield between operator and extinguisher

How a little talk
(with the right person)

The "right person" was E. F. Aschemeyer, at left, Standard Oil lubrication specialist. His practical experience and training helped Elkin solve *their* problem.



stopped a lot of chattering

Chattering and scoring of ways was causing trouble for the Elkin Tool and Manufacturing Company of Detroit. The trouble was noted on a big planer operating under extremely heavy loads. A Standard Oil lubrication specialist recommended the use of STANWAY #95, a very stable oil having extreme oiliness and containing a tackiness agent. Result: smooth operation, complete elimination of chattering and scoring.

STANWAY Industrial Oils were developed to meet the extreme oiliness requirements of certain machine tools which customarily operate under very heavy loads. STANWAY Oils are part of a complete line of industrial oils, cutting oils and coolants that serve all industry.

No matter how "special" your problem may be, there's a Standard Oil product to solve it. There's also a near-at-hand Standard Oil lubrication specialist to help you select and apply the right one. To obtain his services call the Standard Oil office nearest you, or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

STANWAY INDUSTRIAL OILS

STANDARD

STANDARD OIL COMPANY
(Indiana)

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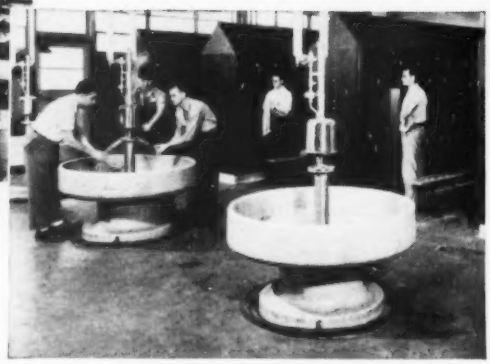
Do Your Washrooms *Date* Your Plant?

If you have obsolete wash fixtures as above —your plant is definitely old.



For the past 30 years, Bradley Washfountains have become the mark of modern washrooms—the most economical and sanitary.

Up to 10 are served clean running water from the central sprayhead.

Foot-Control eliminates faucets and all contaminating contacts, as well as water waste.

Bradleys Universally Used by the Leaders

• In new and remodeled washrooms, Bradley Washfountains provide the finest, cleanest and most sanitary washing facilities. Because each Bradley serves up to 10 simultaneously, piping connections are cut 70% and water consumption 80%. There are no faucets to touch or maintain, —bowl is self-flushing, spread of disease cut to a minimum. In planning new buildings or remodeling, Bradleys will date your washrooms "modern." BRADLEY WASHFOUNTAIN CO., 2273 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY Washfountains

Distributed Through Plumbing Wholesalers

Well-illustrated, helpful Catalog 5204 mailed free on request.

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Inspection revealed defect which could have caused trouble in actual operation

should be provided during the test.

5. Screw cap down tightly.

6. Increase pressure gradually to the test pressure indicated on the extinguisher, but no higher.

7. Maintain pressure for one minute and examine for leakage.

An extinguisher with a leaking shell should be discarded. Never attempt a repair. Date of test should be indicated on a brass tag attached to the extinguisher. *From Factory Mutual Record, published by Factory Mutual Engineering Division, Associated Factory Mutual Fire Insurance Companies, Boston, Mass.*

New Design in Pallets

Because old-style shipping pallets used a lot of material and labor, Bill Blackert designed this new one—easier to build, and cheaper. (From Circle News, published by B. F. Goodrich Co., Akron, O.)

B.F.Goodrich

TW ANALYSIS solves costly tire problem for Aluminum Smelting Company of Cleveland

Cutting and chipping, caused by oil and aluminum scrap, created a problem for Aluminum Smelting Company. The B. F. Goodrich Tire and Wheel Analysis man solved this problem.

Aluminum Smelting Company converts scrap aluminum to ingots. Here an industrial truck carries a load of ingots from the smelting furnace to the shipping department.

CUTTING and chipping of industrial tires, caused by aluminum scrap and oil, created an expensive problem for Aluminum Smelting Company of Cleveland. The tires on this company's fleet of 11 industrial trucks were being "chewed to pieces" after only a week or two of service.

The local B. F. Goodrich Tire and Wheel Analysis man was asked to make a study of the problem. As a result of his findings, BFG Pressed-On Deluxe Cushion tires were installed on all of the trucks. BFG's All-Purpose compounding was specified to provide resistance against oil damage and cutting and chipping.

Here's what Mr. Steve Robusky, Maintenance Superintendent of Aluminum Smelting, has to report—"These BFG tires have helped us eliminate cutting and chipping. Damage from oil has been eliminated almost completely. We have realized substantial savings in tire costs and maintenance expense."

FREE TW ANALYSIS CAN SOLVE YOUR PROBLEM

The B. F. Goodrich Tire and Wheel Analysis is a free service. Just contact your local B. F. Goodrich retailer or mail the coupon below. Without cost or obligation, a trained BFG man will study your materials handling operations. His recommendations can help you cut industrial tire costs . . . reduce maintenance expense. The advice you receive will be unbiased, for B. F. Goodrich makes a *complete* line of industrial tires for every type of service. A special TW Analysis is available for manufacturers of industrial equipment.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-427, Akron 18, Ohio

Please send me:

- ☐ Additional information on your Tire and Wheel Analysis Plan
- ☐ Free copy of "Industrial Tire Guidebook"
- ☐ Free copy of "How to Get Extra Service out of Solid Industrial Tires"

Name_____

Company _____

Street _____

City _____ Zone_____ State_____

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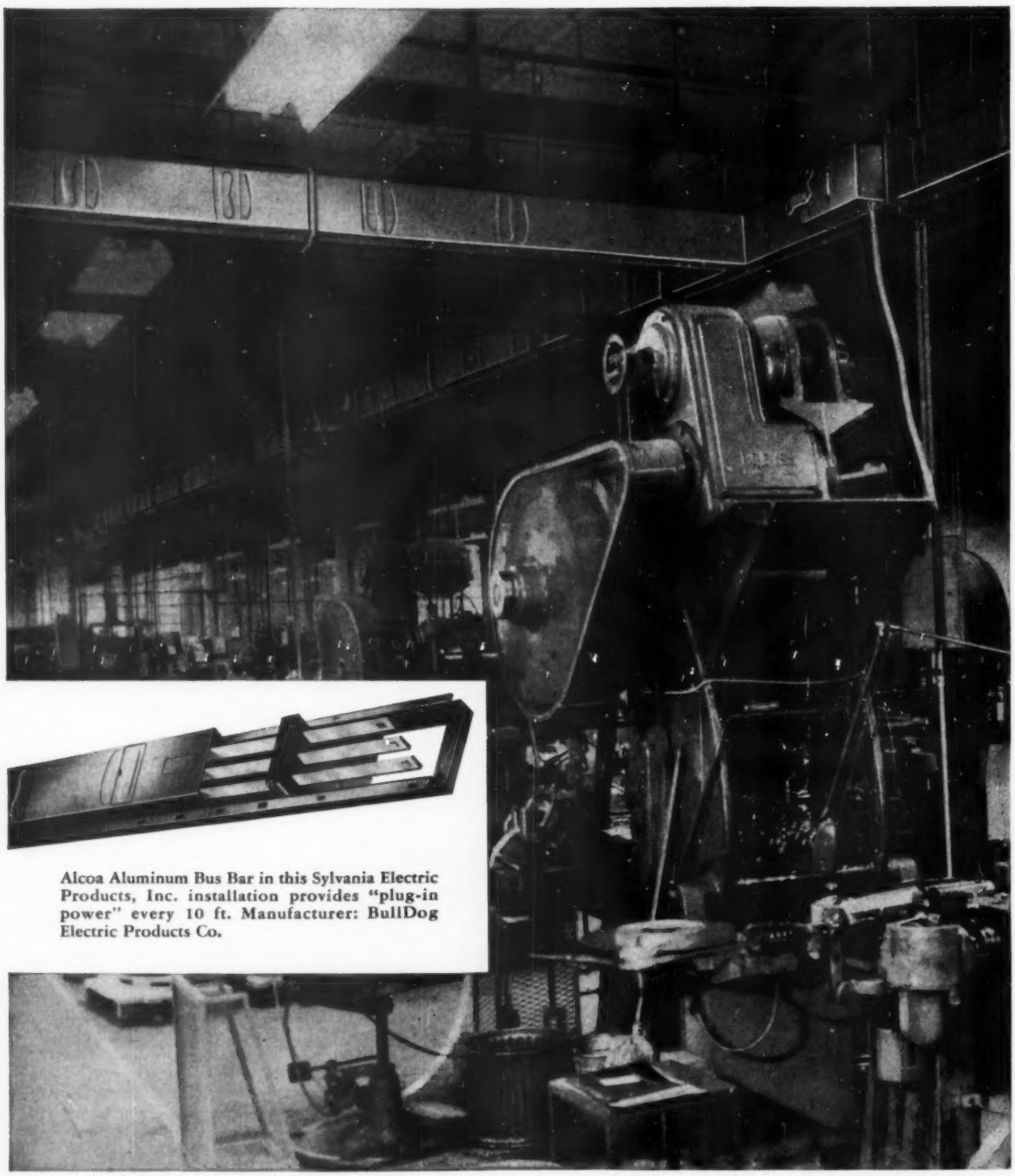
NEW Alcoa bus conductor makes systems stronger, lighter;



Alcoa Aluminum Bus Bar in this Sylvania Electric Products, Inc. installation provides "plug-in power" every 10 ft. Manufacturer: BullDog Electric Products Co.

bus duct saves costs

Tensile properties of Alcoa's No. 2 EC alloy for bus bars are checked on this Baldwin-Southwark tension testing machine, periodically calibrated to assure precision.

Using Alcoa's new No. 2 EC* aluminum bus bars, manufacturers of bus duct systems now can provide you with the most favorable combination of strength, light weight and conductivity at a significant saving in cost.

Alcoa developed this new alloy to meet the demands of distribution bus and isolated phase construction for higher yield strength and better creep characteristics than could be obtained with EC metal. The result is yield strength of 25,000 psi for greater resistance to deformation by short-circuit current surges . . . a compressive creep rate substantially improved over EC . . . and conductivity of 57 per cent IACS.

In bus duct systems, the light weight of No. 2 EC —almost 50 per cent under that of copper—permits the use of simpler and less expensive supporting structures, besides permitting appreciable savings on installation or relocation. Equally important, manufacturers using this new Alcoa bus conductor can save you approximately 10 per cent on your initial investment.

Wherever your production requirements demand an efficient, flexible electrical distribution system, specify bus duct with Alcoa® Aluminum Bus Bar. This dependable product is the result of 59 years of experience, beginning with the world's first aluminum bus bar installation. Use the coupon below to get the names of manufacturers offering bus duct with Alcoa Aluminum Bus Bar.

A precision potentiometer records the voltage drop on test sections of Alcoa Aluminum Bus Bar in the Massena, N. Y., laboratories, world's largest facility for aluminum conductor research.

***PROPERTIES of No. 2 EC-T8**

Tensile Strength, psi	Yield Strength, psi
Minimum—29,000	Minimum—25,000

Conductivity—57 per cent IACS

Aluminum Company of America
2089-L Alcoa Building
Pittsburgh 19, Pennsylvania

Please send me the names of manufacturers offering bus duct systems using Alcoa Aluminum Bus Bar.

Name_____

Company_____

Address_____

City_____ State_____

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

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OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Broken Tools "Burned" Out

REMOVAL OF extremely small tools (0.010 to 0.020 in.) which break off deep within stainless steel parts is no longer a problem at the Rochester Products Div. of General Motors, Rochester, N. Y. In spite of the several hours often required for the removal of a broken tool, the removal being accomplished by dissolving it, the high value of the salvaged parts more than justifies the time, in the opinion of GM officials.

Gently boiling nitric acid, in a 25 per cent solution by volume, is the basis of the new method. Placed in the hole containing the broken tool, it dissolves the tool without damaging the metal surrounding it.

The observance of several precautions is advised by the method's originators. The recess containing the broken tool must be free of oil and chips. In cleaning small blind holes, a hypodermic needle can be used to get solvent into the hole. During the reaction between the acid and the tool steel, the part should be held so that the hole faces upward to permit the escape of the gases produced by the reaction. It will be necessary to replenish the acid in the hole as the reaction proceeds, to assure its continuance.

Experience has shown the Rochester Products engineers that the nitric acid has no effect on many types of stainless steel. Although it will cause a surface darkening on some types, there is no dimensional change.

Paint Dried "From Inside Out"

REVERSING THE USUAL procedure of paint baking and drying operations, where heat is applied after painting to cure the finish, the Barrel Remodeling Co., Kansas City, Mo., has found it faster and more efficient to do some heating before painting, and let the heated mass dry the paint from the inside out. Reconditioned steel barrels are dried in 15 minutes by this

(Continued on page 52)

Simple Chain and Sprocket Conveyor Handles Components in Dipping Operation

Contributed by F. E. Riley

STANDARD SPROCKET CHAINS can be used for conveying work over short distances, if the design is proper. A successful application of chain to a simple conveyor has been developed for applying a plastic protective coating to machined components. The chain conveyor enables the operator to dip the components, dry them and place the finished pieces in tote pans from a single work position.

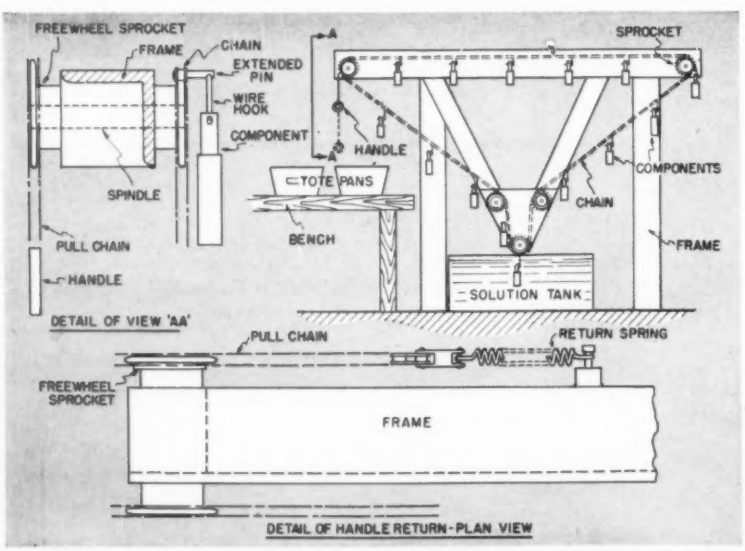
Two tote pans, one containing dipped and the other undipped parts, are placed on a bench in front of the operator, who hangs a component on a simple wire hook attached to the chain, and then pulls down on a handle hanging nearby. The pull moves the chain through a set distance down and to the right. It also brings another hook, carrying a dipped and dry component, into the working area. The dry component is removed and placed in the tote pan, and an undipped component is placed on the vacated hook on the chain.

On the triangular layout of the endless chain, the components eventually travel around a sprocket placed just over the surface of the heated dip solution. Every time the handle is pulled, a component dips into the solution and the one preceding it is lifted out. It takes an extended period of time for the dipped component to reach the loading station above the bench, and when it reaches that point, the dip solution has dried and set.

The hooks are affixed to the chain (as shown in view AA) by knocking out one of the pins in the chain and inserting one which has been machined with an extension. The extension is cross-drilled to take the wire hook. The pins in the chain should be limited in length to avoid excessive overhang that would twist the chain.

When the handle is pulled to move the chain through one dipping cycle, a ratchet return device allows it to return upward, ready for the next cycle. The axle carrying the sprocket nearest the operator is extended through a bearing block in the frame, and carries a second sprocket containing a ratchet device — actually, the unit used is a bicycle sprocket. A length of chain over this sprocket connects the pull handle with a tension spring mounted on the frame. When the handle is released, the spring pulls the chain and sprocket back into operating position, with no backward movement of the conveyor chain.

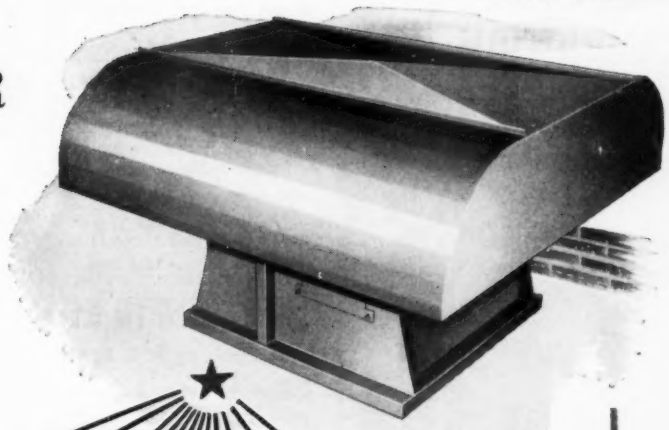
Installation of this conveyor at the dipping station, where the operator previously loaded wire racks with components and dipped them by hand, raised output of the dipped parts by 80 per cent. Another important benefit was the removal of the work station away from the immediate area of the dip tank, with its attendant fumes.

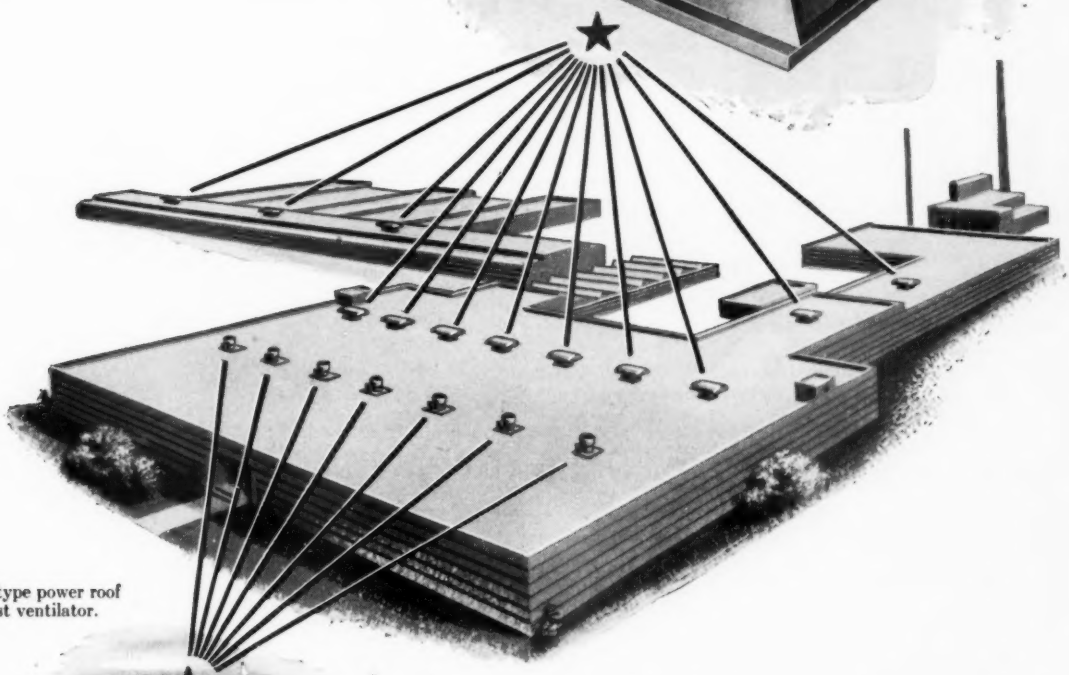


Elevation (upper right) shows arrangement of work station for parts handling

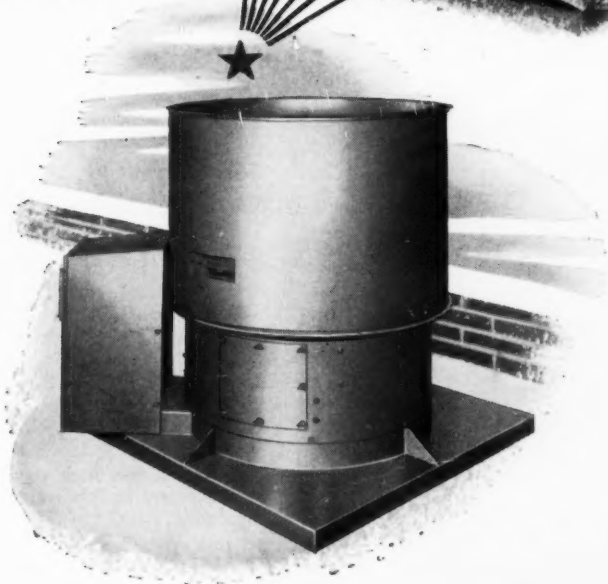
AMERICAN BLOWER
Power
Roof Ventilators

Hood type power roof exhaust or supply ventilator.





Upblast type power roof exhaust ventilator.



American Blower *power* roof ventilators give you the advantages of balanced ventilation, without the uncertainties of gravity units or the expense of a central system.

They're quickly and easily installed on all types of roofs. No extensive duct work is required; no valuable floor space is wasted. Use single units for spot ventilation; several units for large area coverage. American Blower power roof ventilators, supply or exhaust, are available in a wide range of capacities. They are designed to furnish balanced ventilation to industrial plants and commercial buildings.

Ask our nearest branch office for data.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

YOUR BEST BUY IN AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

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OPERATION—PRODUCTION

(O and P begins on page 50)

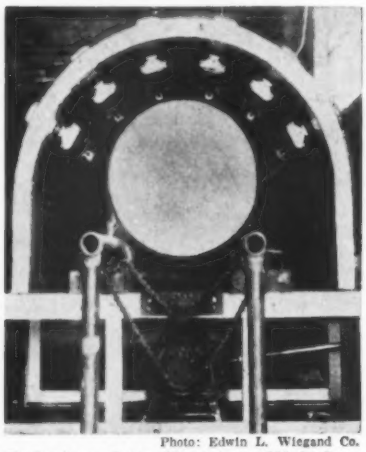


Photo: Edwin L. Wiegand Co.

End view of "radiant tunnel" in barrel restoration plant. Chain drives rollers

method, instead of the three or four hours required for air drying.

Reclaimed barrels are placed on revolving rollers so that heat is applied uniformly and rapidly just before spray painting. Six Chromalox electric heaters, far-infrared high intensity radiant units, are arranged to form a compact open-end radiant tunnel.

In 30 seconds, the barrels are preheated to 175 F. This preheating saves drying time, and the drying process no longer limits production rates.

After heating, the barrels are placed on end-spinners in spray booths for painting. At 175 F, the paint adheres well, and there is no blistering. The paint dries fast and evenly.

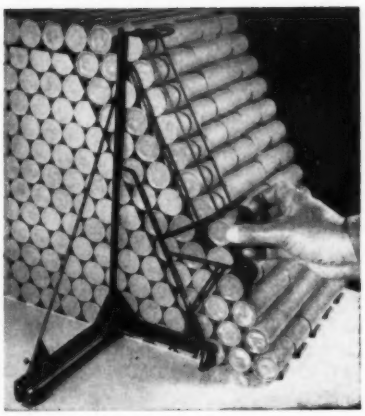
Safe Unstacker For Drums

Contributed by F. E. Riley

EMPTY FIVE-GALLON paint drums used by a paint manufacturer are stacked 13 drums high, in rows of five, with a sloping stack front.

One method of unstacking these drums is to stand on a ladder and remove them one at a time, working down from the top of the stack. Another more dangerous method is to pull out a drum about half way up one tier, hoping that the rest of the stack will not collapse.

To eliminate the use of ladders and the dangerous practice of pulling drums out of the middle, an unstacking device has been developed.



Model of unstacking device illustrates operation as drum is taken from stack

An L-shaped base mounted on casters has a vertical steel tube, equal in height to the drum stack, at the junction of the two horizontal legs of the base. Tubular framework, the width of one drum, is positioned at a slope on the vertical column, the slope angle equal to that of the front row of drums in the stack. The framework spans the top seven drums in the stack and serves as an inverted runway.

The sixth drum from the bottom of the stack is the most convenient one for the average man to pull out. When this drum is removed, the top seven in the stack will roll down, but will be prevented from jumping off the stack by the framework holding them in place. The impact of the falling drums will not displace the fifth drum in the stack, since another tubular member prevents its movement.

The top seven drums in the stack can be removed in this way, and then the bottom five can be removed safely. The next tier can be removed by moving the unstacker along the tier to service the front face of the stack, and continuing the procedure will permit fast unstacking of all the drums.

Light-Reflecting Sheeting Serves as Material for Tank Emblem

EMBLEMS MADE of "Scotchlite" brand reflective sheeting, each one 25 ft wide and 22 ft high, mark a 150-ft water tower of the Minnesota and Ontario Paper Co., International Falls, Minnesota.

The emblems were applied to the water tower by the weatherproof pressure-sensitive adhesive on the back of the sheeting.

Made in the M and O company art department, of material made by Minnesota Mining and Manufacturing Co., the emblems are fabricated in opaque black and transparent green colors. A transparent plastic coating brushed over the completed emblem adds to their luster and durability. The smooth surfaced plastic material partially cleans itself in rain.

Day and night views of reflecting emblem illustrates high visibility qualities

Welding Does a Maintenance Job

COMPLETE BREAKDOWN of a compressor head used in the steam and diesel plant in the local generating station of Barranquilla, Columbia, S.A., posed a problem of major proportions.

Since the original cast iron head had been imported from Belgium, a delay of at least a year was expected before a replacement could be obtained. Obviously, fast action was necessary, since the breakdown seriously affected the station operation.

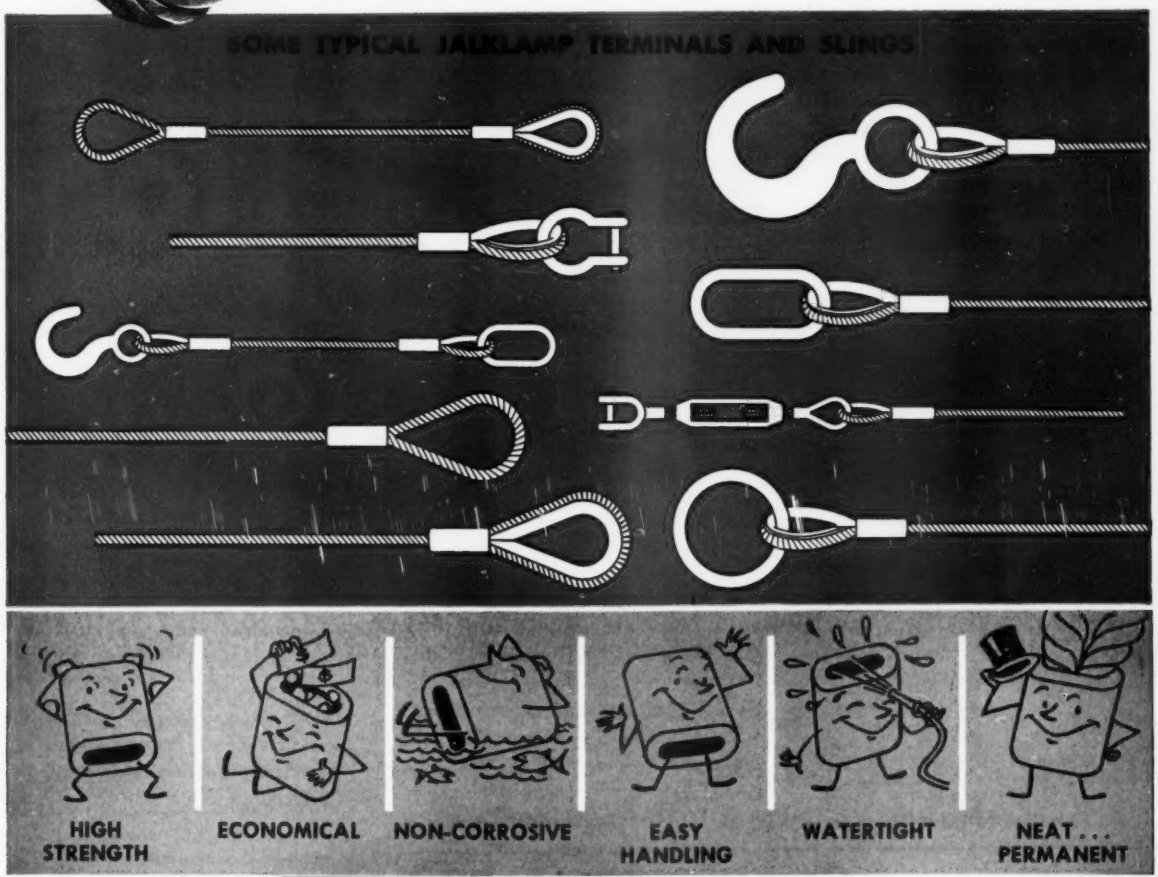
Chief mechanic Miguel Penate, an experienced welder, built up new flanges and ring by joining alternate sections of square and round bars. This

END YOUR SPLICING PROBLEMS WITH J&L JalKlamp SLINGS AND TERMINALS

Now, thanks to JalKlamps, you can order J&L Wire Rope with terminal splices which afford unsurpassed strength, corrosion resistance, safety and ease of handling. *And JalKlamp Terminals cost far less than you would spend to do the job yourself with conventional tucked splices.*

J&L JalKlamps are new non-corrosive special alloy sleeves with tremendous strength and unique cold forming characteristics. When squeezed around wire rope by a special hydraulic press, the JalKlamp metal "flows" into the spaces between the wires in the strands and the strands themselves, producing a neat, homogeneous splice as strong as the rope itself.

Take advantage of the extra economy . . . long service life offered by J&L JalKlamps. You can get J&L Wire Rope Terminals and Slings spliced with JalKlamps in all standard constructions, and in diameters from ⅛″ to 2″ with these centers—SpringKore, Plasti-Kore, Fibre Core and IWRC.



J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

For more facts circle 540 on Reply Card

JADE-LITES SPEED PRODUCTION AT PHILADELPHIA THERMOMETER CO.

Lustra Jade-Lite Fluorescent Tubes reduce glare, eyestrain, reports General Mgr. L. W. Scanlan

PHILADELPHIA, PA.—The Philadelphia Thermometer Company in this city has discovered a simple new way to speed production, according to L. W. Scanlan, General Manager.

The new method consists of a Lustra Jade-Lite lighting system recently installed in the production department in place of the formerly used slimline and fluorescent tubes. "The old lighting system," says Mr. Scanlan, "caused an annoying amount of glare. At the suggestion of our local Lustra man, we installed Lustra Jade-Lite Fluorescent Tubes and immediately both glare and eyestrain were substantially reduced, with the end result that production has been substantially speeded."

THE LUSTRA JADE-LITE. Reports from the Philadelphia Thermometer Company and other industries throughout the country, indicate its superiority for precision work.

AFTER CONFERRING WITH A LUSTRA MAN, the Philadelphia Thermometer Company decided to replace ordinary slimline and fluorescent tubes in production department with Lustra Jade-Lites. Result was elimination of eyestrain, speed-up of production.

Lustra Corporation reports similar results with their lighting in plants throughout the country and makes this statement to all plant-men: "You can definitely improve lighting efficiency and production in your operation with the Lustra Lighting Line."

For information write: Lustra Corp., Dept. PE-11, 111 Water Street, Brooklyn 1, N. Y.

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OPERATION—PRODUCTION

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Photo: The Lincoln Electric Co.
Before and after views of severely damaged compressor head as rebuilt

particular construction created fillet sections which could be filled in with electrode, to produce a homogeneous section in the structure.

Thirty days and 200 lb of Lincoln Fleetweld welding rod later, the rebuilding of the compressor head was completed. The time saving was invaluable, and total cost was $380.00.

Applied Hydraulics Saves Motors

Contributed by D. D. Douglas

SPECIALLY-CONSTRUCTED covers protected the windings of three 20 HP motors during recent high floodwaters of the Des Moines River at Fort Dodge, Iowa. Not removed from their foundations, these vertically installed pump motors, after being under several feet of water for two days, were immediately available for service when the water subsided.

Flood water rose considerably above the height of the motors, and compressed the air in the box-like covers so that resistance of the contained air built up sufficient pressure to keep the water below the motor windings. The protection was made more effective by the 10-in. thick concrete floor, the height of the windings above the foundation and by river silt which deposited to seal the cracks between the metal covers and the floor.

The airtight covers were made of 10-gage steel plates, welded into a shape to completely cover the motors,

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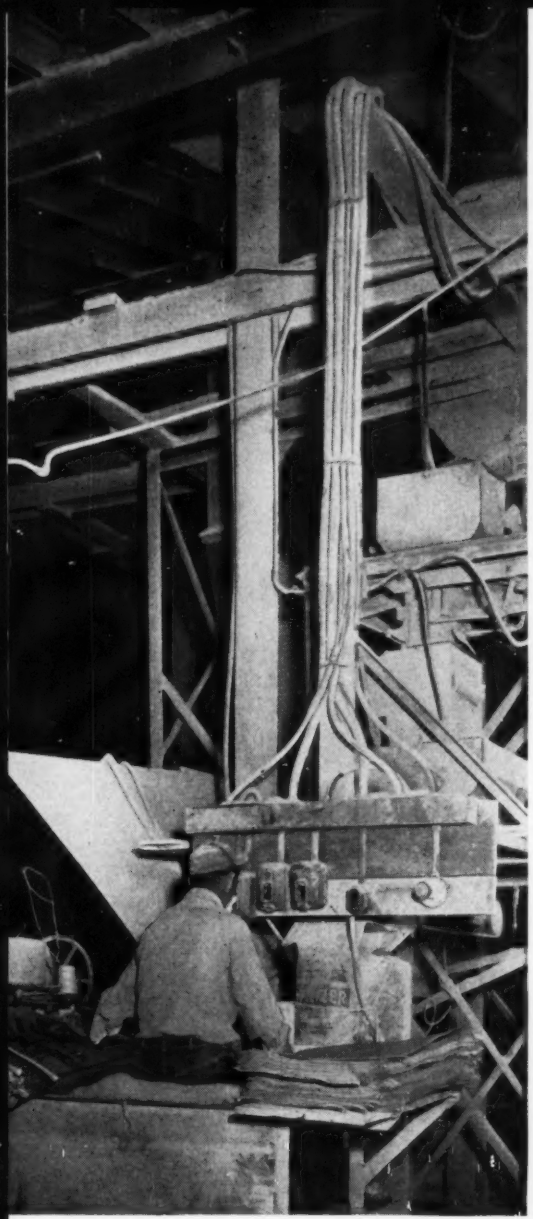
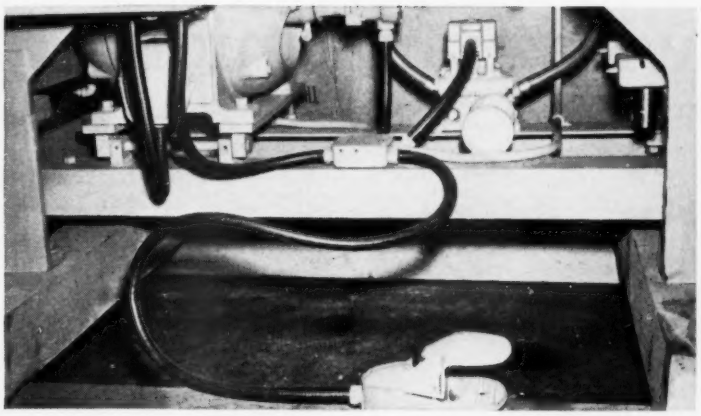
SEALTITE Flexible Electrical Wiring Conduit makes news



. . . in a fertilizer plant

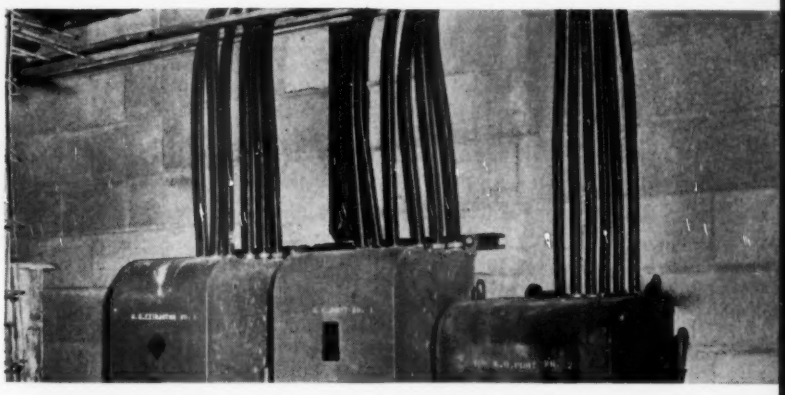
Phosphoric acid in the form of dust quickly ate through neoprene covered wiring at a Midwestern fertilizer plant. Then SEALTITE Type E.F. (Extra Flexible) was installed to protect power and lighting wiring. Since then there's been no trouble. SEALTITE's tough synthetic cover gives complete, permanent protection against moisture, oil, dirt, grease, chemicals and corrosive fumes. Lightweight SEALTITE comes in easy-to-handle coils and can be cut to required lengths.



. . . on tube end-forming machines

SEALTITE* Electrical Wiring Conduit is now standard equipment on all tube end-forming machines made by Vaill Engineering Co., Waterbury, Conn. Vaill found most customer specs are copies from J. I. C. — especially sections dealing with wiring in wet or oily locations. And SEALTITE Type E.F.† (Extra Flexible) meets J.I.C. requirements. "SEALTITE presents good contour-hugging appearance," says Vaill. Because it is *flexible*, SEALTITE absorbs vibration and protects wiring to moving parts. SEALTITE is easy to install, too. There's no threading. No cumbersome tools are needed. No special skill is required.

*Trademark †Pat. Applied For 54177



. . . in a yarn and knit goods dye house

American & Efird Mills, Mount Holly, N. C., knew electrical equipment in their new textiles dye house would operate under very severe corrosive conditions. At first, some rigid conduit was installed along with SEALTITE Type U.A. Acids in the atmosphere caused the rigid conduit to fail rapidly. But SEALTITE Type U.A. — the first *flexible* conduit to win Underwriters' Approval for use where exposed to moisture and mineral oils—took it in stride. Now all rigid conduit is being replaced with SEALTITE. American & Efird reports big time-and-dollar savings in installation, too.

FREE BOOKLET! Write today for your free copy of Bulletin UA-531, describing SEALTITE Types U.A. and E.F. and their applications. The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.

SEALTITE

flexible, liquid-tight electrical conduit

an ANACONDA® product

Seals stay "MISER-TIGHT" with Dart Unions

This True Ball Joint Makes the Difference

Darts pay off because they maintain tight seal at the seat as long as in service — and as often as piping is changed. Yes, you can use Darts over and over again — for real economy!

QUICK FACTS

- Extra wide seats of bronze alloy that resist pitting and corrosion
- Heavy shoulders to take severe wrenching without harm
- Leakproof because precision-machined to a true ball joint and spherically ground
- Nut and body practically indestructible — of air-refined, high test malleable iron

DART
UNIONS

DART UNION COMPANY • PROVIDENCE 5, RHODE ISLAND

The Fairbanks Co. — Distributors: Boston • New York • Pittsburgh • Rome, Ga.

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OPERATION — PRODUCTION

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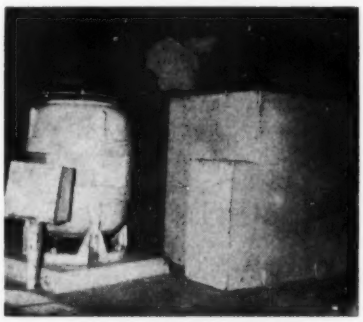

Fig. 1. Welded steel cover, beside motor it protected from high flood water

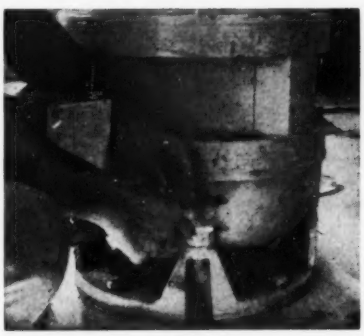

Fig. 2. Upper pointer is at winding, lower pointer at high water mark

wire junction boxes, and connecting conduits. After the conduit openings were sealed with a waterproof insulating material the covers were placed over the motors and bolted securely to the floor.

This method of protection proved to be so effective and economical that a number of other covers have been made to protect similarly located equipment which may be subject to future high water damage.

How to Lubricate Plug Valves

INTENDED TO ASSIST the plant engineer in getting maximum service out of plug valves, engineers of the Rockwell Manufacturing Company's Nordstrom Valve Division offer the following tips on plug valve servicing:

1. Plug adjustments should be snug — tight enough to keep the plug from becoming unseated, but not to a degree requiring excessive force to operate the valve.
2. Lubrication should be periodic, systematic, and with the proper grade of lubricant.
3. Fresh supply of lubricant can be

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telling the story of dag dispersions

Here is a Heat-Proof Dry-Film Lubricant

It's 'dag' colloidal graphite. It comes dispersed in a variety of liquid carriers . . . water, oils, volatile hydrocarbons, resin-solvent combinations . . . which get it where it should go, and then put it to work.

Spray it on, paint it on, apply it by dipping. 'dag' colloidal graphite produces a durable, *dry lubricating film* that won't gum up or break down at any of the temperatures you are likely to run into. It is unaffected by heat up to 750°F. . . . with a coefficient of friction so low that moving parts just keep on moving.

'dag' colloidal graphite works where conventional lubricants have failed . . . on oven conveyors, in bearings of kiln-car wheels, on conveying equipment for hot strip steel, and in places where degreasers destroy most lubricants . . . almost everywhere that high heat and friction must be licked to keep things going.

Let 'dag' colloidal graphite dispersions cure these headaches for you. Details are available in Bulletins No. 424-L0 and No. 435-L0.

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS

Acheson Colloids Company, Port Huron, Mich.

...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try resin-bonded dry graphite films for permanent lubrication

INSURANCE SAVINGS ALONE

will pay for an

ALGRIP

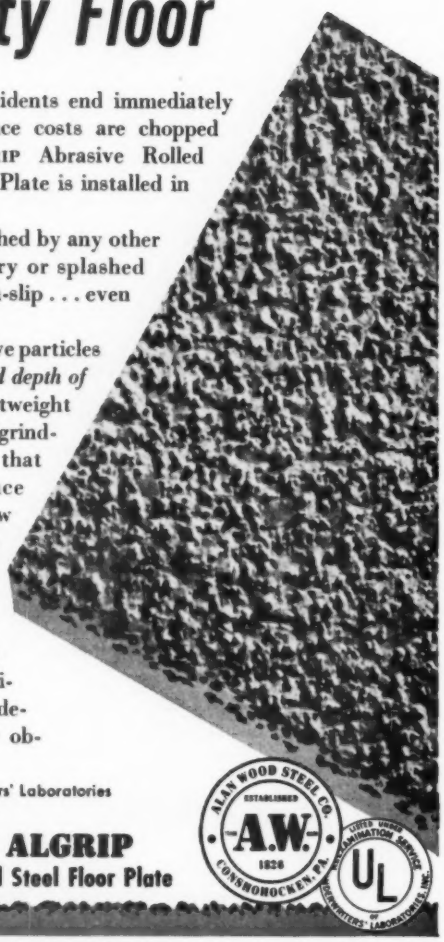
Safety Floor

Slipping accidents end immediately and insurance costs are chopped when ALGRIP Abrasive Rolled Steel Floor Plate is installed in any plant.

ALGRIP's safety is unmatched by any other material because wet, dry or splashed with oil, ALGRIP *stays* non-slip . . . even on steep inclines.

Hundreds of tiny abrasive particles impregnated *to a controlled depth of penetration* into tough, lightweight steel plate give ALGRIP a "grinding-wheel" grain surface that never wears smooth since hard use only exposes new gripping particles . . . an exclusive ALGRIP feature.

ALGRIP foot safety actually costs nothing, because it pays for itself in savings on insurance premiums. Write today for full details. There's no cost or obligation.



ALGRIP is Underwriters' Laboratories approved for safety.

A.W. ALGRIP
Abrasive Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

Name _____ Title _____

Address _____

City _____ Zone _____ State _____

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OPERATION — PRODUCTION

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easily forced between the seating surfaces by giving the lubricant screw a few turns.

4. Depletion of lubricant in the valve lubrication system will require the addition of several sticks before lubricant can be forced into the seat. Lubricant should be added until increased resistance is felt in turning the lubricant screw, or until there is increased pressure when gun lubrication is used.

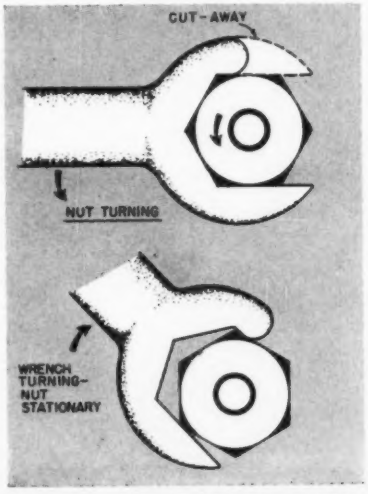
5. Turn the plug slightly when lubricating to assist in the distribution of lubricant and to determine if the adjustment is correct. If the valve is lubricated with the adjustment too loose, efficient lubrication cannot be obtained. Further, the valve may be permanently unseated, allowing the lubricant to quickly dissipate and the valve may leak. If the valves are overlubricated with the adjustment too loose, it can be corrected by alternately tightening the adjustment and turning the plug. This will work out the excess lubricant and permit the plug to return to its proper position.

Improvised Ratchet Wrench

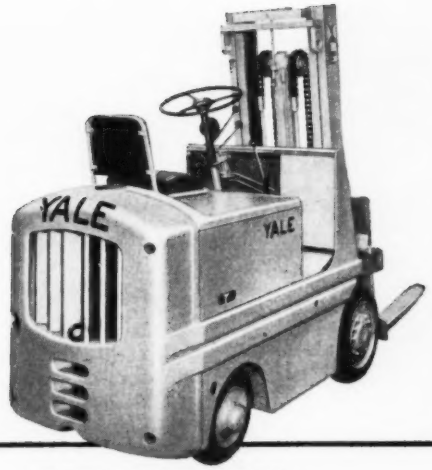
Contributed by R. E. Franklin

TIGHTENING of numerous draw bolts spaced closely around the periphery of large castings, with an ordinary open end wrench, is a tedious and time-consuming job. In a chemical plant, modifying a standard wrench converted it to a form of ratchet wrench with reciprocating action.

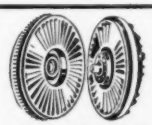
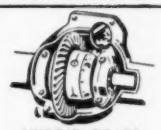
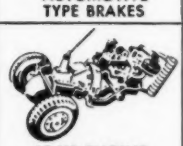
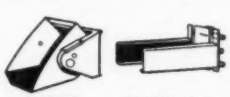
When tightening a nut with the



Nut tightening and returning positions of open end wrench after modification



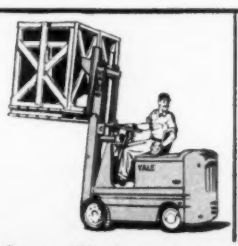
Here's straight talk about YALE GAS TRUCKS

FOR ENGINEERS		FOR OPERATING MEN
Most starting slip takes place in coupling, not clutch. As slip of the coupling produces no wear, clutch life is increased 3 to 8 times.	 FLUID COUPLING	Reduces gear shifting and clutch using. Gives smooth starts and stops without lurching or stalling . . . making it easy to inch up on loads. Reduces maintenance.
Triple reduction spur and hypoid gears to the drive axle are in an oil-tight housing. Has 4-pinion differential.	 HYPOID GEARS	Can stand up under punishing, heavy duty loads. They are sealed against dirt and dust . . . seldom need maintenance.
Inclined king pin reduces overhang of tires. Steering wheels turn at maximum angle of 80°. Articulated mounted steering axle for proper ground contact.	SHOCKLESS STEERING	Provides passenger car steering comfort. All controls are located within easy reach. Road shock of rough terrain or floor level variation is minimized.
Mounted on banjo housing inside wheel. Automotive type seal on wheel bearings. Positive equalizing action.	AUTOMOTIVE TYPE BRAKES	Extra braking surface permits smoother, safer, surer stops with heavy loads or when maneuvering in tight space.
6 cylinder Chrysler Industrial—bore 3¼", stroke 4⅝", 230 cubic inches piston displacement. The complete power assembly is supported on rubber mounts.	 65 HP ENGINE	Packed with plenty of reserve power for ramp climbing. Built for rugged, continuous service . . . seldom requires maintenance. Cool running.
These are only a few of the exclusive or desirable features that add to the safety, economy, efficiency of YALE Gas Trucks. Attachments like those shown are available for special handling jobs.	 SHOVEL SCOOP CLAMPING DEVICE	YALE'S complete Operator Training Program can mean smoother, trouble-free operation and longer Truck life. Ask your YALE representative for information or mail the coupon today.

YALE*

INDUSTRIAL LIFT TRUCKS AND HOISTS

*Reg. U. S. Pat. Off.



The YALE & TOWNE Manufacturing Co., Dept. 4711
Roosevelt Boulevard, Philadelphia 15, Penna.
Please have your local representative call on me.

Company_____

Name_____ Title_____

Street_____ City_____ State_____

In Canada write: The Yale & Towne Manufacturing Company
St. Catharines, Ontario, Canada

Gas, Electric, Diesel & LP-Gas Industrial Trucks • Worksavers • Hand Trucks • Hand & Electric Hoists • Pul-Lifts

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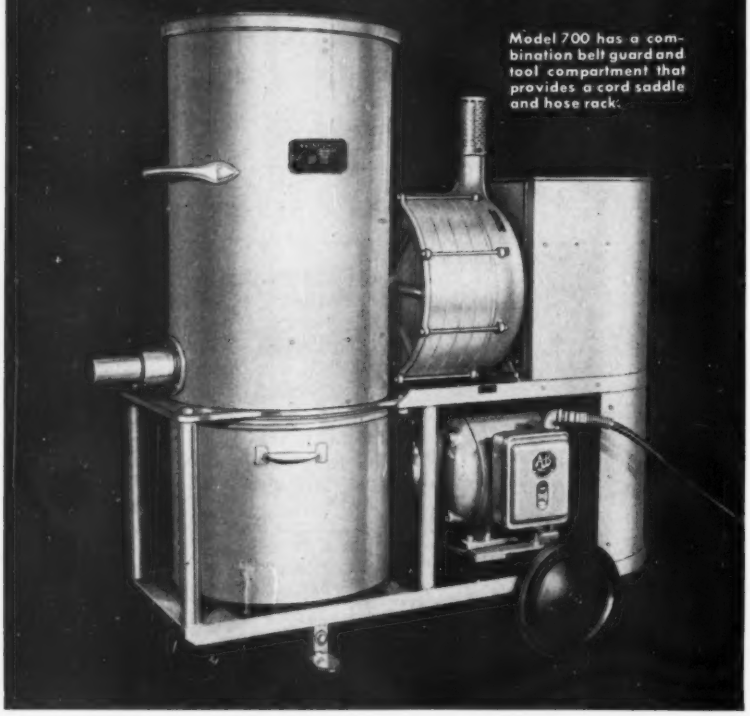
announcing...

New INVINCIBLE

7½ H.P. Vacuum Cleaner



Model 700 has a combination belt guard and tool compartment that provides a cord saddle and hose rack.

MODEL 700 IS SPECIALLY DESIGNED FOR:

- *Pipe Line Installations*
- *Material Conveying Problems*
- *Oversize Maintenance Jobs*

POWERFUL—Invincible Model 700 is engineered for rugged, *continuous* use. The 7½ H. P. Motor drives a powerful 5-stage turbine unit that will rapidly handle not only dirt but metallic parts, liquids, chemicals, foodstuffs, etc. Even abrasive material presents no problem, because complete separation precedes the vacuum producer.

LIGHT AND COMPACT—Weighing only 550 lbs., Invincible Model 700 can be rolled by one man with ease. It is 54½″ high, 54″ long and 23″ wide.

ENGINEERED TO YOUR NEEDS—Competent Invincible engineers can adapt Model 700 to *special* production or materials handling jobs. They can supply the proper primary tanks, cyclonic separators or attachments.

WRITE FOR FULL DATA

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 50)

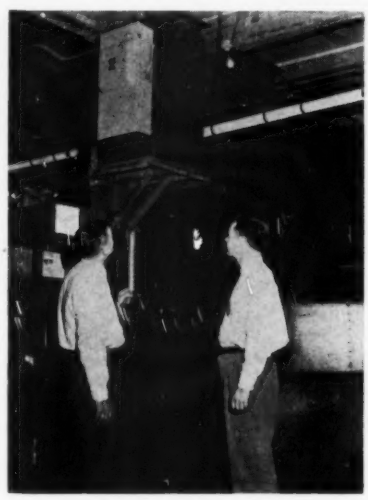
wrench, the shortened leg pulls on one corner of the nut. A movement in the opposite direction will cause the radius of the shortened leg of the wrench to ride over the flat of the nut, at the same time disengaging the wrench from the other side of the nut. If this backward motion is continued through 60 deg, the wrench will fall into place on the next pair of flats.

In its modified form, the wrench can be used for pulling in either direction, by merely reversing it when the direction of the pull is changed. The wrench has proved useful in positions where space is confined, and in operations where space is not a limiting factor, it has been found usable at twice the speed of a standard wrench with full length jaws.

Capacitors Pay Off in Savings

SAVINGS of approximately $300.00 per month are reported by the Colson Corp., Elyria, Ohio, following the installation of capacitors on their power distribution system.

The capacitors, made by General



One of several capacitor installations that increased power factor in system

Electric, were installed to reduce the strain on the power system. Totalling 450 kva, the units corrected the power factor from a low of 84 per cent to more than 95 per cent, and also eliminated the need for rewiring and the need for some new equipment.

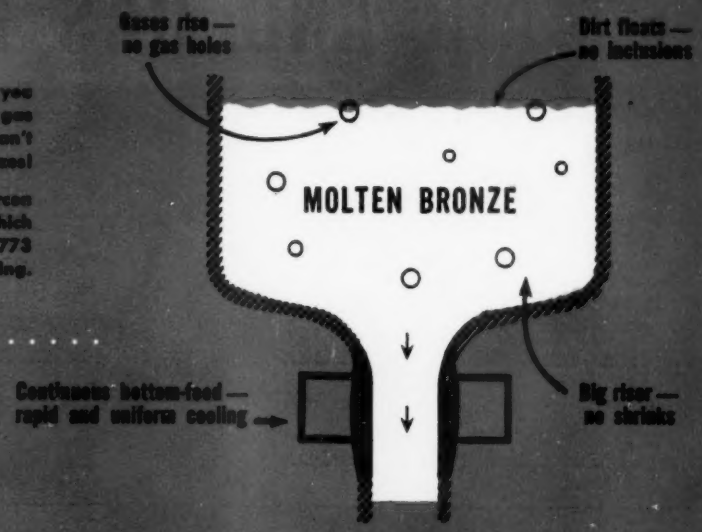
Installations were made near the centers of the loads, in the screw machine shop, boiler room, arc welding department, wood shop, and truck shop.

Save on Bearing Bronzes . . . Asarco's Continuous-Cast Quality and Sizes Conserve Metal and Machine-Shop Time

You lose metal . . . you lose time . . . you ruin tools . . . when machining uncovers gas holes, shrinks, dirt, inferior metal. But it can't happen with Asarcon 773 (SAE 660) bronzes!

The sketch shows how the patented Asarcon process eliminates the metal defects which gnaw at machine-shop profits. Asarcon 773 assures sound castings, profitable machining.

HERE'S WHY . . . . . .


Gases rise — no gas holes
Dirt floats — no inclusions
MOLTEN BRONZE
Continuous bottom-feed — rapid and uniform cooling
Big riser — no shrinks

Save on Lengths: Your distributor gives you exactly the length you want from 0 to 105". You buy less metal. There is no short-end scrap loss.

Save on Diameters: Clean-up allowances on Asarcon bronzes, both inside and out, are only a quarter those of rough-cast bars. You take less out of tools, reduce machining time; and again, buy less metal.

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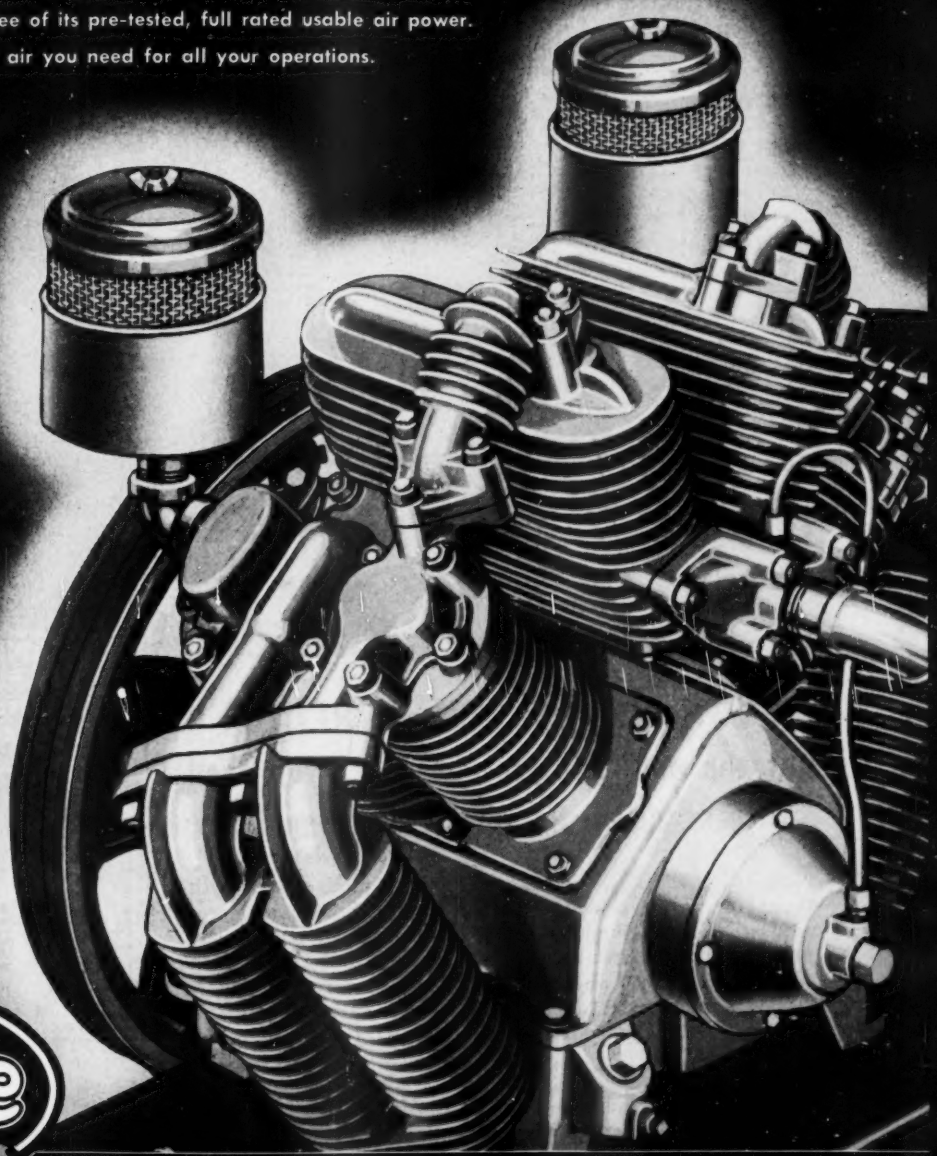

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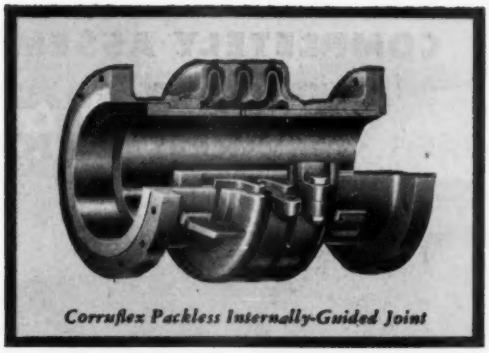

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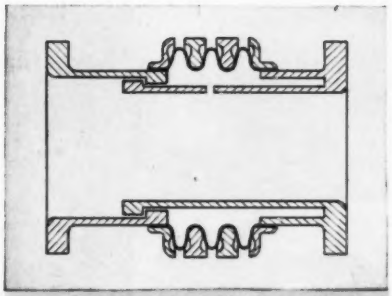
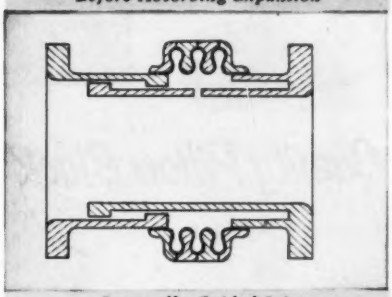


Internally-Guided Joint Before Absorbing Expansion



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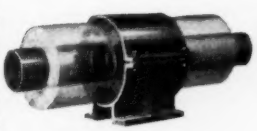

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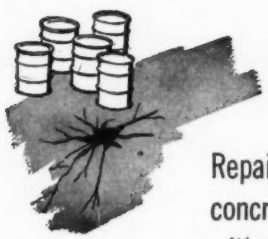

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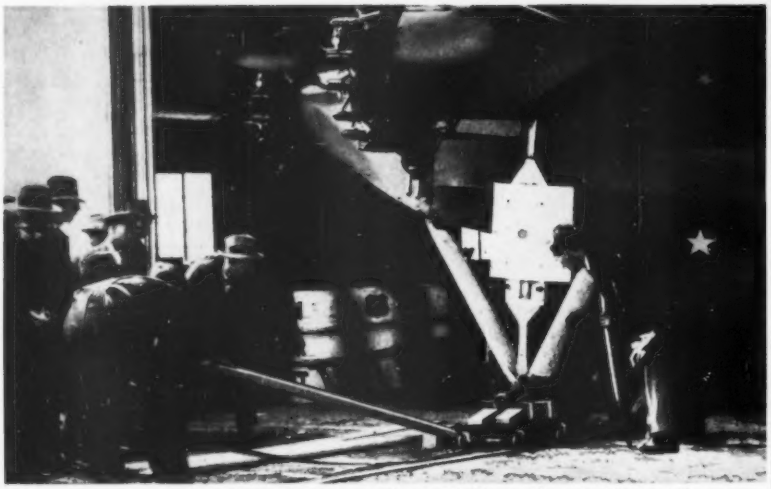
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

From "Southern Cross" to B-36-- Bassick takes over on the ground

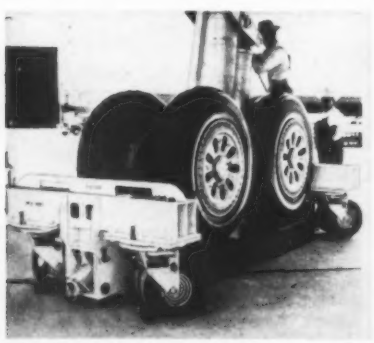


"Southern Cross," standing on dollies equipped with Bassick casters, gets once-over from Australian pilot Kingsford-Smith (right).

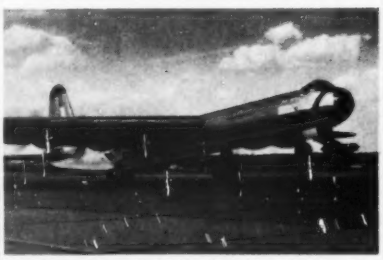
Flying the big ocean

In early June, 1928, the 3-engine "Southern Cross", piloted by Kingsford-Smith, made the world's first trans-Pacific flight from San Francisco to Brisbane, Australia.

Proven conventional Bassick casters were selected for pre-flight handling of the "Southern Cross". Today Bassick casters are specifically designed to meet exacting requirements for safe efficient handling of modern aircraft.



80,000 lbs. is no strain for these 4 Bassick casters.



Another Convair-built 6-engine B-36 takes off.

25 years later

Convair of Fort Worth, Texas, chose Bassick to produce the highly specialized dual 18" wheel "Floating-Hub" shock-absorbing caster for their B-36 handling dollies. These 675-pound giants have an operational load rating of 20,000 pounds each yet permit easy, precise handling of these huge Air Force bombers in production. Bassick's "Floating-Hub" shock absorbing casters help preclude airframe damage during assembly by eliminating winding stress, shock and vibration due to dolly handling — write for "Floating-Hub" catalog FH-53.

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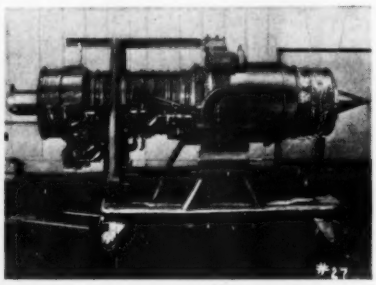
Fretting corrosion?



"Fretting corrosion", killer of modern jet engines, is another problem licked by Bassick's patented "Floating-Hub" casters — the only caster designed to absorb both horizontal and vertical shocks.

When wheels equipped with "Floating-Hub" roll over obstacles or rough surfaces, their deflection is controlled and their recovery immediate — preventing damaging shock forces, vibration and winding stress from being transmitted to the vehicle or precious cargo. Vibration frequencies are interrupted and immediately damped out by the inherent snubbing action, precluding resonance and "fretting corrosion". Ask for catalog FH-53.

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Grease dripping from bearings exposes them to premature wear — increasing maintenance and repair cost. It's also an accident hazard and harms floor surfaces and rubber tires. Cure: Bassick grease retainer cup now *standard* on all Bassick Series 99 casters.

Get all the facts on the most complete line of shock-absorbing and conventional casters from your Bassick industrial distributor. He's got the stock and the know-how to give you fast efficient service on all your requirements.

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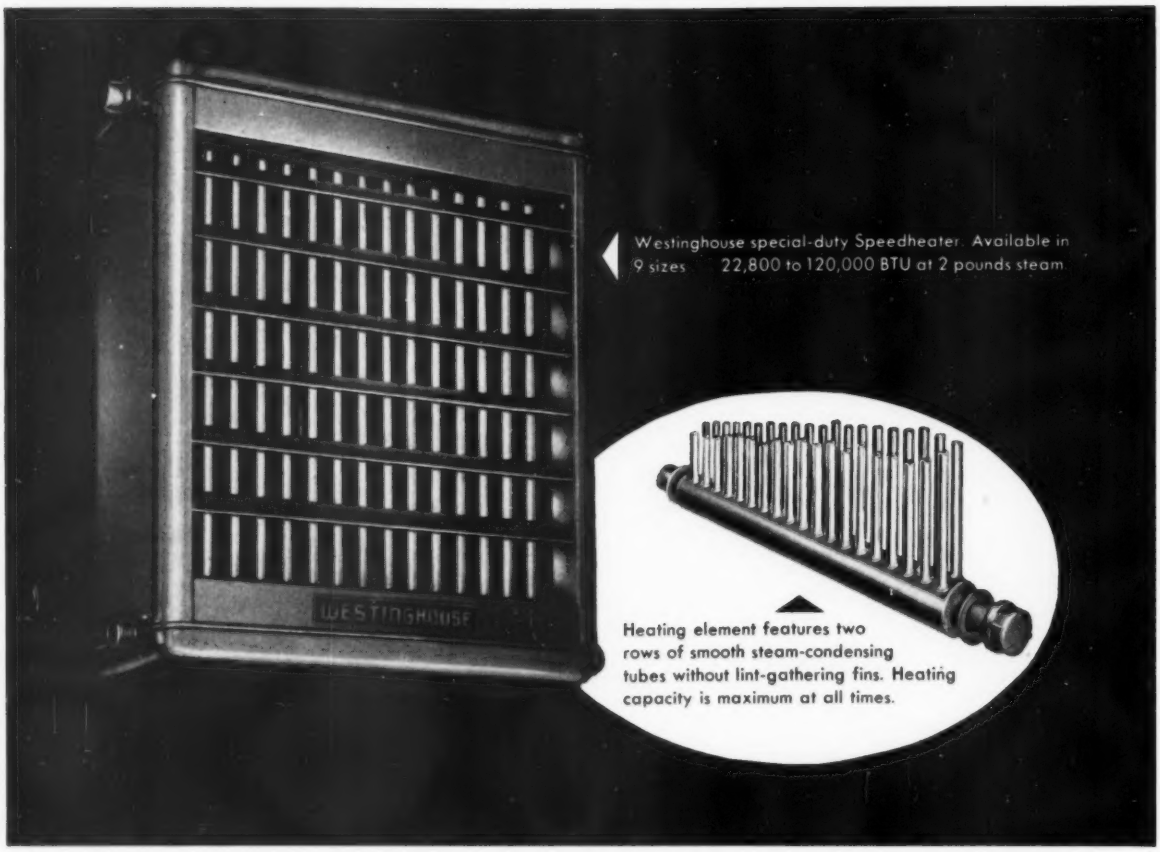
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Heating element features two rows of smooth steam-condensing tubes without lint-gathering fins. Heating capacity is maximum at all times.

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by Byron A. Engelbach, Plant Engineer

PRACTICAL APPLICATIONS

In previous Construction Briefs, the principal fundamentals of beam design as applied to wood and steel have been presented with specific examples of their use in individual cases. It should be clearly understood that only the basic principles, and not all phases of design have been covered. There are others which the design specialist would consider and investigate before definitely fixing a member. It now seems appropriate to present problems applying combined principles, to establish the use of the fundamentals, before moving along to other structural members.

The problems to be presented are, in general: (1) the designing of floor joists and their supporting girders and beams, as they form the framework of a floor to safely support the greatest superimposed load which they may be called upon to carry; (2) the determination of the maximum safe load for an existing floor.

Before making any calculations to determine structural member sizes, it is necessary (or advisable) to know the spans of the joists, whether there are openings in the floor, and the longitudinal partitions supported on the floor. A framing plan should be made. This plan will show the floor area that will be supported by each joist and also the position of partitions or any special loads. If the floor is supported by posts and girders, the position of these should also be accurately indicated on the plan. Where the joists are supported by walls or partitions, the spans of the members will be fixed by the walls or partitions as shown on the plan.

Floor Loads

Having decided on the arrangement of joists, drawn a framing plan and located all special timber, the next step is the determination of loads for which the frame work is to be proportioned. Floor loads are made up of two parts; the weight of the material used in the composition of the floor and framing, which can in some instances amount to considerable weight, and the superimposed load. The first is the *Dead Load* and the second the *Live Load*. When the *Safe Load* for a floor is referred to, it is the *Live Load* which is meant, unless otherwise stated.

Wooden floors usually consist of beams, referred to as joists, or floor joists, and one or two thicknesses of flooring boards and a ceiling supported on the underside of the joist. In mill construction or warehouse construction the floor boards often are replaced by plank, either plain edge or splined and one layer of floor boards.

Generally speaking, individual designers have standard weights of materials which they use. In this instance, assume that in figuring the weight of standard 7/8-in. floor boards that it is sufficient to estimate a single floor or thickness as weighing 3 lb per sq ft, and a double floor as weighing 6 lb per sq ft. The joists should be figured at 3 lb per ft, board measure, except in cases where hard pine or oak is used, and the weight is 4 lb per ft board measure. The weight of the joists must be converted to their equivalent weight per sq ft of floor.

The weight of lath and plaster ceiling will be assumed 10 lb per sq ft.

As previously stated, the first step is the preparation of a framing plan of the floor, elaborate enough to show the spans and floor areas supported by the members, and any special framing.

The second step is the approximate

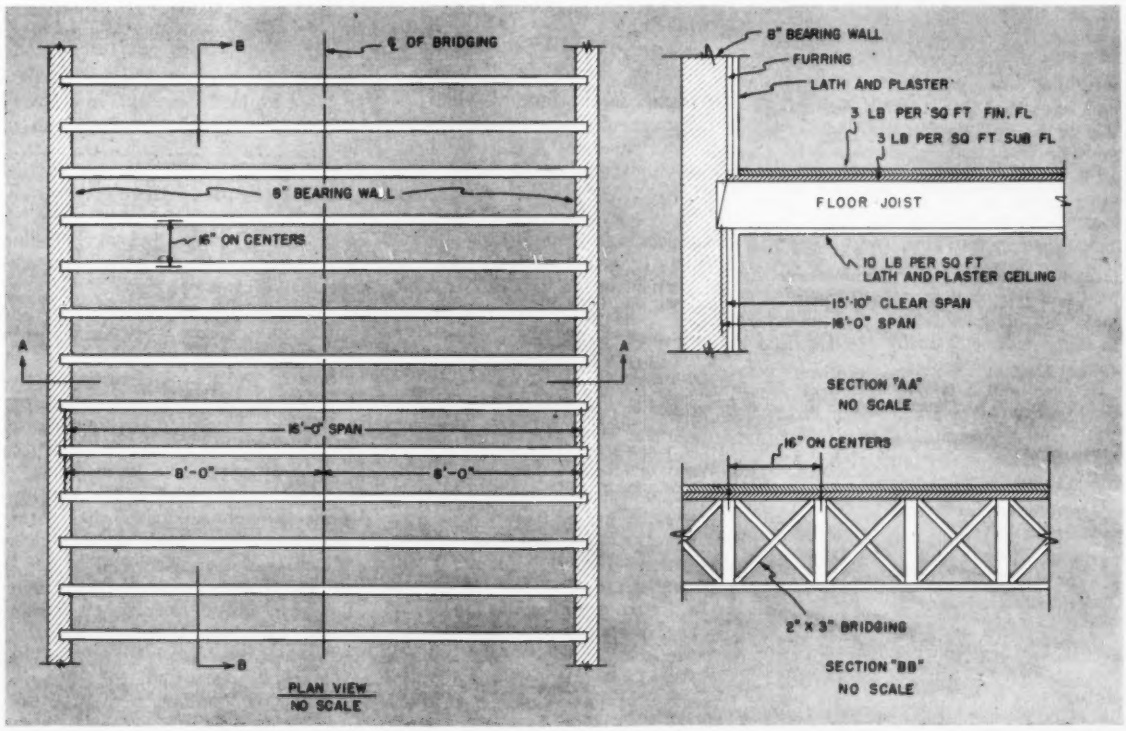

Fig. 1. Simplest form of basic floor framing, using 2 in. by 12 in. joists. Elevation sections show finishing details

determination of the weight of the floor and the superimposed load per square foot of floor to be supported.

The third step is the actual computation to determine the dimension of the common floor joist. Incidentally, if the flooring is predetermined to be plank construction, the thickness of the planking is determined first and then the floor joists are calculated. For most buildings, the size of floor joists can be determined by reference to tables found in Engineering Handbooks. For special cases the sizes must be computed, using formulas previously presented. For the joists, the load supported by a single joist must be computed and then used in the formulas. In cases of computing plank flooring, the tables may again be used.

Use of Tables. *Too much stress cannot be placed on cautioning any designer in the use of tables. Be sure to understand the purpose and information which is presented in any table before using the data therein. Even the most seasoned designer will occasionally select a wrong table.*

Problem No. 1

Assume the simplest type of floor framing, as shown in Figure 1. All joists have equal span length and equal spacing and are simply supported on bearing walls.

Live load may be taken as 40 lb per sq ft. The joists are to be common spruce weighing approximately 27 lb per cu ft, with a maximum fiber stress of 880 lb per sq in. The flooring spanning the joists is two thicknesses of ⅞-in. boards, the sub floor, pine weighing 3 lb per sq ft, and the finish floor weighs 3 lb per sq ft. Assuming this to be an intermediate floor in a multiple story building there will be a 10 lb per sq ft lath and plaster ceiling hung on the bottom of the joists. The span is 16 ft. Find a safe joist size.

Solution

Step 1. Solve for the combined dead load and live load for which the joist must be designed. For preliminary figuring assume 2 in. by 12 in. joists spaced 16 in. on centers.

Each joist supports 1.33 sq ft of floor per ft of length. The 2 in. by 12 in. joists weigh 2/12 x 27 lb or 4.5 lb per linear foot and ¾ x 4.5 or 3.375 lb per sq ft of floor.

Combining the loads:

Floor Joist	3.375
Fin. Floor	3.0
Sub Floor	3.0
Plaster Ceiling	10.0
Live Load	40.0
Total Uniform Load	59.375 lb

Using a value of 60 lb, each joist carries 1.33 x 60, or 80 lb per running foot. The total uniform load on the joist equals 16 x 80, or 1280 lb.

Step No. 2. Assuming no tables are available, it is possible to determine the proper size of joist required to carry the determined uniform load by the use of formula. First the resistance to bending must be investigated by the use of the flexure formula

$$I = \frac{M \times n \times 12}{f}$$

The moment of inertia thus found is that which must be equal to and preferably slightly less than the moment of inertia of the joist finally selected.

First find the bending moment or the value of M for substitution in the formula. The proper formula to use is

$$M = \frac{W1}{8}$$

$$= \frac{1280 \times 12}{8}$$

$$= 1920 \text{ ft lb}$$

Therefore, by substitution

$$I = \frac{1920 \times 12/2 \times 12}{880}$$

$$= 157$$

The moment of inertia of the assumed joist must now be checked with the moment just found. In this case the dressed size of the joist, 1⅝ in. by 11½ in., should be used. As a rule the moment of inertia would be found in an Engineering Handbook. However, in this case it will be calculated by substitution in the formula

$$I = \frac{b\ (h)^3}{12}$$

$$= \frac{1.625\ (11.5)^3}{12}$$

$$= 206$$

A comparison of the calculated required moment of inertia and the moment calculated for the assumed size of joist indicates that 2 in. by 12 in. is on the safe side. Had the moment of inertia been appreciably larger than 206 it would have been necessary for economic reasons to check the next size smaller such as a 2 in. by 10 in. joist. By the same token, had it been smaller, it would have required selecting the next size larger, such as a 2 in. by 14 in. joist to satisfy the economic and structural requirements.

Step 3. Shear across the grain very rarely requires investigation in wood design, when the beam is strong enough to resist the bending moment. However, a good designer will leave nothing to chance and make the investigation. Therefore, assume a unit working stress for shear across the grain for common spruce of 500 lb per sq in. (Note that this is not the ultimate shear stress).

It then follows that maximum shear on the joist in question is equal to one half the total uniform load, or 640 lb. The standard dressed size must be used in calculating unit shear and in this case is 18.7 sq in.

Therefore, unit shear equals 640/18.7 or 34 lb per sq in. This calculated figure is so far below the permissible stress that there can be no question of the safety of the joist.

Step 4. Horizontal Shear is the next point to be investigated and, unlike the shear across the grain, should always be considered. Assume that unit working stress for this type of shear is 56 lb per sq in. for common spruce. Use the formula

$$S_h = \frac{3V}{2bh}$$

and by substitution

$$= \frac{3 \times 640}{2 \times 18.7}$$

$$= 51$$

This shear stress is below the permissible and the joist is safe for horizontal shear.

Step 5. Deflection must next be investigated. First, however, the permissible deflection must be found which is 1/360 of 16 ft, or 0.533 in.

The deflection due to the load is found by substitution in the formula

$$\text{Defl.} = \frac{5W1^3}{384\ EI},$$

which applies to a beam, simply supported, carrying a uniformly distributed load. Then by substitution,

$$\text{Defl.} = \frac{5 \times 1248\ (192)^3}{384 \times 1{,}200{,}000 \times 206}$$

$$= 0.46 \text{ in.}$$

It will be noted that this deflection is less than the permissible, and the beam is safe.

Conclusion. In all instances the joist sized 2 in. by 12 in. will safely carry the combined loading for a span of 16 ft.

For such a simple problem, no further investigation is necessary. However, if the loading was of a moving type due to trucks, etc., the bending moment formula would change, resulting in a different solution.

Bridging will be necessary in the condition presented. Bridging is a simple method of bracing the joist by means of short struts. Such practice is customary and as a rule compulsory by municipal building codes which call for this added stiffening on lines from 5 to 8 ft apart. To be effective, it must be installed in a straight line, along the floor so that each bridging strut may abut directly opposite those adjacent. It is of decided advantage in sustaining a concentrated load upon the floor, but it does not materially strengthen a floor to resist a uniformly distributed load. It is primarily used to prevent joists from turning.

Municipal building codes present safe load and maximum spans for floor joists, ceiling rafters and roof rafters.

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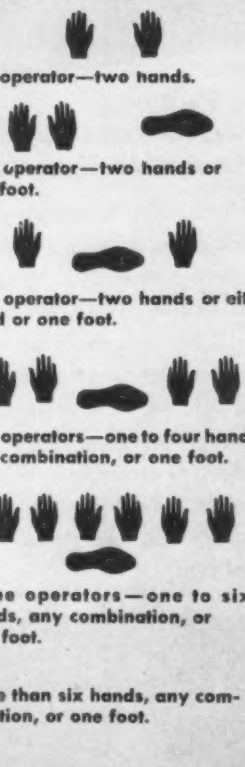

1 One operator—two hands.

2 One operator—two hands or one foot.

3 One operator—two hands or either hand or one foot.

4 Two operators—one to four hands, any combination, or one foot.

5 Three operators—one to six hands, any combination, or one foot.

6 More than six hands, any combination, or one foot.

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Cut-away section of Yarway Impulse Steam Trap showing only moving part, a small stainless steel valve.

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Fig. 1. Dick Morris, Editorial Director, Plant Engineering; Erwin Kubsch, Chief Electrician; John Goodwin, electrician; and Bill Harvey, photographer, just before entering hot, humid Telecote Tunnel

Where Men Can't Work MACHINES MUST!

THIS IS THE STORY of a tunnel. Not just any ordinary tunnel but one of the toughest engineering nightmares ever tackled.

It is also the story of a product, of a chemical formula, and how it helped defeat the tunnel's heat and humidity.

It was four years ago that engineers began work on the six-mile long Tecolote Tunnel, a project that will bring water through the tough ribs of the Santa Ynez mountains to the community of Santa Barbara, Cal.

One obstacle after another—from blinding streams of hydrogen sulphide gas, to flowing sand—impeded the work. But the worst obstacle was reached when the tunnel tapped a rushing stream of hot water. Nearly a million gallons a day pours into the passageway turning the project into a humid, watery hell for both men and equipment.

These steaming, chemically-laden waters are so corrosive that even heavy steel pipe is rendered worthless in a few months. So, what of the electrical equipment? What protective measures could be applied to assure its performance?

To get the answers to these and other problems, Dick Morris, Editorial Director of Plant Engineering, in company with John Bainbridge; Archie Lee, Industrial Editor, Los Angeles Daily News; and Bill Harvey, Photographer; visited the Tunnel and interviewed Erwin (Olie) Kubsch, Chief Electrician. Charles Conrad, General Supt., and Henry Franey, Safety Engineer, all of Coker Construction-Peter Kiewit Sons Co., also were present.

The interview was invaluable but the trip into the tunnel made every day by the tunnel workers was rough. They were assaulted by the foul, hot air; they were drenched with sweat; Bill Harvey's camera was ruined; their eyes were irritated by hydrogen sulphide.

After the trip they came out of the tunnel dunked in a car full of hot water which, they report, was actually refreshing after the 115 F temperatures endured in the tunnel. The information they obtained, and which is printed here, came from the long (twelve, single-spaced typewritten pages) interview with Olie Kubsch. It tells of the machines' ordeal by corrosion and moisture and of the chemical substance, Safe-T-Seal*, that helps them endure.

Following is a transcript of some of the questions and Mr. Kubsch's answers.

Question: Under normal tunnel operations how long does an electric motor last?

Answer: In some tunnels, perhaps for the duration of the job, but to achieve this the motor must really be run under ideal conditions.

Question: How have they lasted on the Tecolote job?

Answer: At first, from one day up to a week depending upon the location within the tunnel. Then we tried different

*Safe-T-Seal is a proprietary product which has the property of inhibiting ionization, enhancing insulation properties under wet conditions, reducing flashovers and reducing corona effect.

Fig. 2. At the main pump station water temperature is 109 F and the wet and dry bulb temperatures both 96 F

Fig. 3. From a combination of heat, corrosive gases and long hard service, the locomotives frequently finish a shift with the lead battery connectors covered with drops of molten metal which Erwin Kubsch is showing to visitors

types of seals. None of them worked for more than a short period until we tried Safe-T-Seal. Now it seems our problems are solved.

Question: I noticed you had telephone communications between the tunnel and the outside. Did you have any trouble with the telephone equipment?

Answer: This was really a headache. We have installed all kinds of cable, and telephones of every description, including first class mine 'phones; none of them lasted more than a few hours. Then we built our own 'phone and sealed the entire mechanism with this material from one end to the other. We sealed the relays, the coils and the headset.

Question: What type of transformers do you use on this job?

Answer: Both dry-type and oil filled. They step down the voltage from 2500 to 440.

Question: I noticed a neat but unusual treatment on the connections and potheads. What is your method of making these connections?

Answer: First, we wrap the connection with asbestos tape, next Scotch tape, then rubber tape, and friction tape. It is then painted with General Electric's Glyptal. Then it is Safe-T-Sealed on the outside. Previously we had installed transformers whose connections would corrode completely off the transformer.

Question: All the motors we saw were open motors. Have you tried any enclosed motors?

Answer: No. I don't believe enclosed motors would work as well. Open motors have been doing a good job since we have had them processed.

Question: Do you buy the motors already processed or do you buy standard motors and treat them after they burn out?

Answer: All the motors in the tunnel have standard windings. They are processed before they are taken into the tunnel.

Question: Is it true that you now treat all parts of the starter, switches, and fuses because the treatment stabilizes the laminated panels and the fiber coverings? That it prevents warping and distortion? For example, what is the comparative life of untreated cartridge fuses?

Answer: Cartridge fuses, of course, have copper or brass on one end with cardboard or fiber in the center. If they are untreated, the center portion becomes twisted, the fuse cannot make perfect contact, and it burns up. Untreated fuses sometimes last a week; some treated fuses have been in there a month, and are still in there.

Question: What was your maintenance practice in regard to switches and starters before you had them processed?

Answer: They would kick out every two or three weeks and would be replaced.

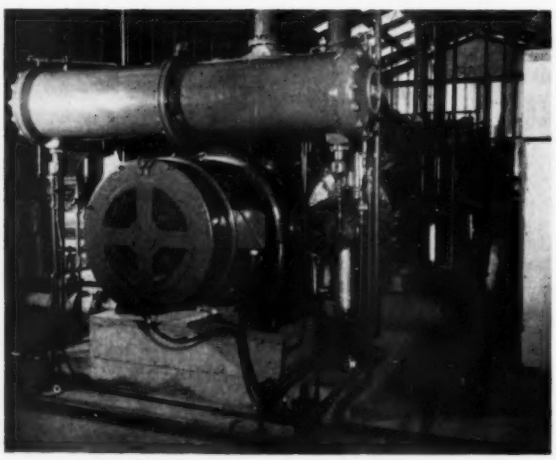


Fig. 4. In the compressor house four units, totaling nearly 7000 cfm or about four times the requirements of a normal tunnel job, supply compressed air to drive pumps so that exhaust air will be available to cool motors

Fig. 5. All electrical equipment is now treated chemically and knife switches in the tunnel are covered with heavy grease

Question: With re-winding motors what type of insulation do you specify?

Answer: They are wound with standard insulation but, because of the Safe-T-Seal, this insulation does a far superior job.

Question: How about the four big Joy air compressors? Is this not a rather unusual capacity for a job of this size?

Answer: Yes. A job of this size would normally use only one compressor and even then would have air to spare. However, we are using air driven pumps which give us the added advantage of using the compressed air for its cooling effect. Normally these pumps would be electrically driven.

Question: I understand that the d-c locomotive motors frequently operate in and under water. What is your experience with the service life of these motors both treated and untreated?

Answer: A motor that isn't treated will not run more than one day. In fact, usually the coils from the armature have to be replaced. On the other hand, some treated motors have been in service for two or three months.

Question: Do you have any information on temperature readings in the tunnel?

Answer: Yes, temperatures on September 25 were typical of that week, the week we made the record 162 ft. The maximum temperature was 114 F; water at the pump station was 109 F; at the car pass, two miles in the tunnel, and at the exit, it was 106 F. Air temperatures at the pump station were 96 F for both wet and dry bulb; at the car pass they were 80 F wet bulb and 82 F dry bulb; at the end of the air line 64 F and 90 F; and at the heading, 72 F and 81 F.

Want More Information?

If you would like additional details on Safe-T-Seal, just drop a line to The Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill. Or, write Safe-T-Seal on one of the postage-paid cards elsewhere in this issue and put it in the mail box.

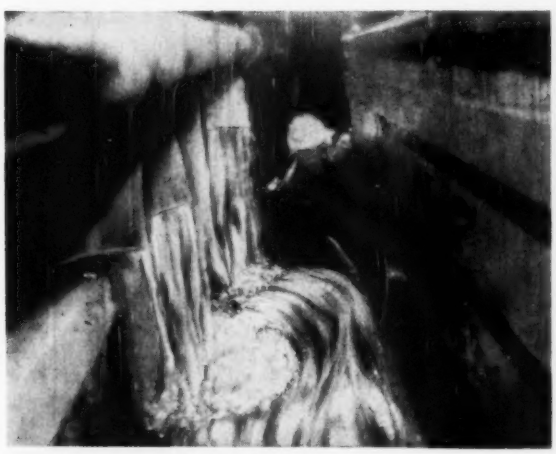


Fig. 6. Chief Electrician Kubsch inspects one of the locomotives at a point of heavy water flow. The total flow from the tunnel has decreased from 9100 to 7200 gpm and the maximum water temperature from 116 F to 114 F

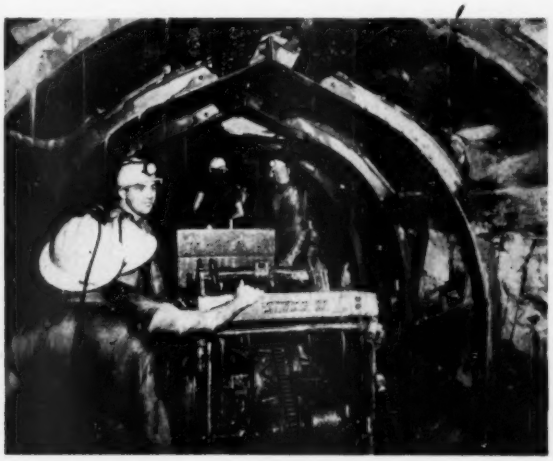


Fig. 7. Electric loaders such as the one shown here are used to remove shale and rock from the tunnel head in Tecolote. Even heavy steel rusted under impact of the 115 degrees, 100 per cent humidity conditions encountered in Tecolote

How to Make and Raise A FLAG POLE or ANTENNA

By WM. S. EDWARDS, Superintendent of Construction, Coca-Cola Bottling Works, Cincinnati

AFTER MANY CONFERENCES and careful planning we completed construction of The Coca-Cola Bottling Works Company plant in Cincinnati, which at the time was purported to be the most modern bottling plant in the world. Apparently nothing had been overlooked.

Then came World War II and we discovered to our amazement that in all our planning we had overlooked an important item, a flagpole. Our large auditorium had been turned over to the Red Cross for making bandages, and a flagpole for both the American and the Red Cross flags was the order of the day.

Due to its surroundings the pole had to be a minimum of 65 ft high. We were confronted with several problems. One, both contractors and equipment companies were needed for more essential work. Two, our new and beautiful lawn would be ruined by a crane. Three, the cost could, without good planning, be prohibitive.

So I tackled the problem and came up with an answer that was not only practical and inexpensive, but simple: a pole constructed like a telescope so it could be extended with ease.

Since many other plant engineers are called upon to erect a flagpole or antenna, I felt that our experience and success might be helpful to others. I believe the sketches and explanation will be understandable to all.

Procure one length each of 5 in., 4 in., 3 in. and 2 in., standard galvanized pipe with couplings; one each malleable iron reducer 5 by 4, 4 by 3, 3 by 2 and 2 by 1.

Chuck the 5 by 4 reducer in a lathe and bore the 4 in. end to 4-9/16 in. inside diameter. This allows 1/16 in. clearance for easy travel over the 4 in. pipe. Turn down the 4 in. coupling to 5-1/64 in. outside diameter, allowing about 1/32 in. clearance in the 5 in. pipe.

Make a mark that will not easily rub off, entirely around the 4 in. pipe 3 in. from the lower end. Screw the 4 in. coupling on and swab the coupling the entire length of the 5 in. pipe to be sure there is no obstruction in the pipe.

Screw the 5 by 4 reducer on the 5 in. pipe and measure from the top of the reducer down 36 in. to the point where four ⅜ in. holes are to be drilled, equally spaced, around the 5 in. pipe. The use of these holes will be explained later.

Bore the 3 in. end of the 4 by 3 reducer to 3-9/16 in. ID and turn down the 3 in. coupling to 3-15/16 in. OD.

Measure 30 in. from the bottom of the 3 in. pipe and mark as before. Screw the 3 in. coupling on and insert it in the 4 in. pipe. Try it for clearance. Next, screw the 4 by 3 reducer on and measure down from the top of it 30 in. and drill four holes 5/16 in. around the 4 in. pipe as before.

Bore the 3 by 2 reducer to 2-7/16 in. ID and turn the 2 in. coupling to 3 in. OD and repeat the operation as before with four 5/16 in. holes drilled 24 in. down from the top of the reducer.

Place the 2 by 1 reducer on the 2 in. pipe and a 1 by 6 nipple in the reducer to receive the ball or ornament.

Drill a 17/32 in. hole just under the 2 in. reducer entirely through the pipe to receive the flag rope pulley. Make sure the pulley allows clearance for the flag rope splice when it becomes necessary to renew the rope.

Assemble on the ground near the excavation, since the entire assembly will weigh approximately 800 lb. Drive a ¾ in. thick wood plug into the bottom of the 5 in. pipe. In the center of the plug there should be a 1¼ in. hole into which you may screw a 1 in. by 6 in. nipple as a weep for condensation.

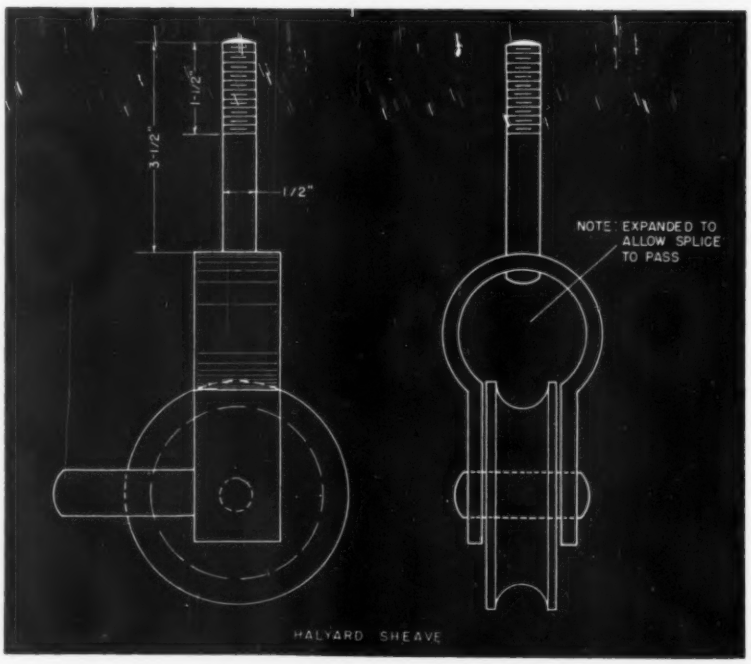
Erect a tower of 4 in. by 4 in. wood pieces, well sway-braced. It will probably be necessary to splice the two diagonal corner posts to allow head room under the top cross beam of the tower (see sketch).

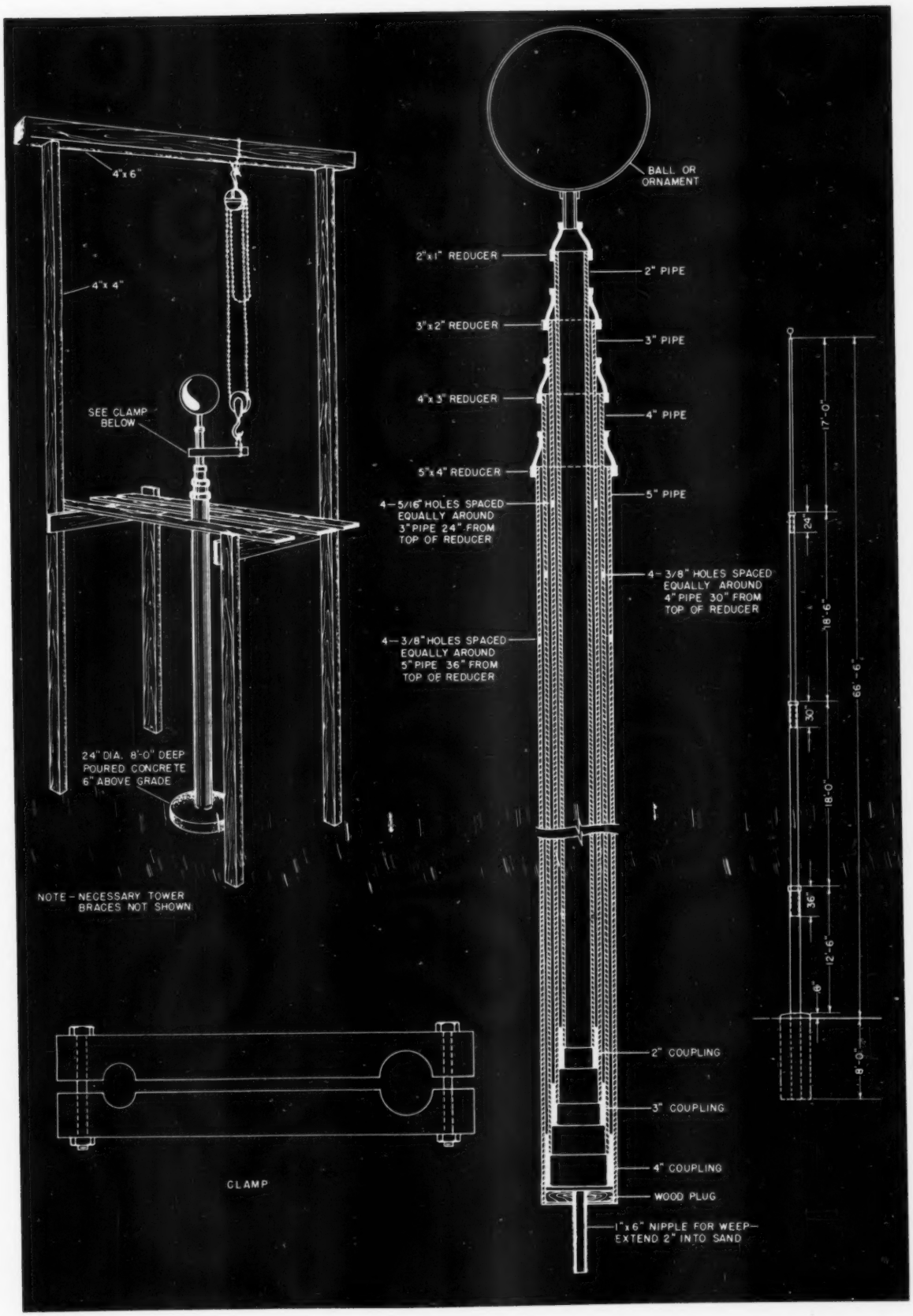
Attach the sling and chain block and pick up the entire assembly, allowing the bottom to enter the excavation. Place about 3 in. of sand in the bottom as a weep drain.

Plumb and brace the pole. Then pour the concrete and tamp well around the pipe. It is advisable to ex-

(Continued on page 188)

Fig. 1. Method of constructing the halyard sheave for the flagpole is shown in this drawing while Fig. 2, opposite page, gives other details for constructing pole




4"x6"
4"x4"
SEE CLAMP BELOW
24" DIA. 8'-0" DEEP POURED CONCRETE 6" ABOVE GRADE
NOTE - NECESSARY TOWER BRACES NOT SHOWN
CLAMP
BALL OR ORNAMENT
2"x1" REDUCER
2" PIPE
3"x2" REDUCER
3" PIPE
4"x3" REDUCER
4" PIPE
5"x4" REDUCER
5" PIPE
4-5/16" HOLES SPACED EQUALLY AROUND 3" PIPE 24" FROM TOP OF REDUCER
4-3/8" HOLES SPACED EQUALLY AROUND 4" PIPE 30" FROM TOP OF REDUCER
4-3/8" HOLES SPACED EQUALLY AROUND 5" PIPE 36" FROM TOP OF REDUCER
2" COUPLING
3" COUPLING
4" COUPLING
WOOD PLUG
1"x6" NIPPLE FOR WEEP-EXTEND 2" INTO SAND
17'-0"
24"
18'-6"
66'-6"
30"
18'-0"
36"
12'-6"
6"
8'-0"

Lube Oil Specifications— Which Ones Are Important?

Lubricating oils are refined to meet rigorous control test specifications . . . Many of these are unimportant, as such, to the ultimate consumer . . . Author lists "specs," tells which should concern the plant engineer when ordering

By **BRUCE M. DUNHAM, Technical Consultant, Sun Oil Company**

MANY AND DEVIOUS are the ways of describing a lubricating oil to its potential purchaser, the plant engineer. Much confusion has existed in establishing purchasing specifications for mineral lubricating oils and greases because of the wide variety of these products offered by the many suppliers.

Lubricant manufacturers procure crude oils from a variety of sources, refine to base oils by a variety of methods and blend to finished products using their own formulations. Their prime objective is to produce products on the basis of satisfactory performance characteristics. Thus, physical and chemical properties of finished lubricants intended for identical applications may differ widely in some details without indicating that they will not properly perform in their intended functions.

Some agreement has been reached, particularly with relation to those physical and chemical specifications which have service performance significance. "A.S.T.M. Standards on Petroleum Products and Lubricants" have been adopted by most users. Some users also refer to limitations stipulated by the Society of Automotive Engineers and by the American Gear Manufacturers Association.

There has been an established trend to describe the limits of lubricants based upon the control tests established in oil refineries. These tests include gravity, flash, fire, viscosity, viscosity index, color, neutralization number, carbon residue and pour point. These tests are very important to the refiner in controlling the manufacture of lubricants, and refinery laboratories conduct thousands of them each month to guarantee consistent products. Nevertheless, only some of these particular tests are significant in service application.

Gravity: As an indication of product usefulness or quality, it has little significance. It is merely used as a means of determining weight per unit volume or indicating oil type.

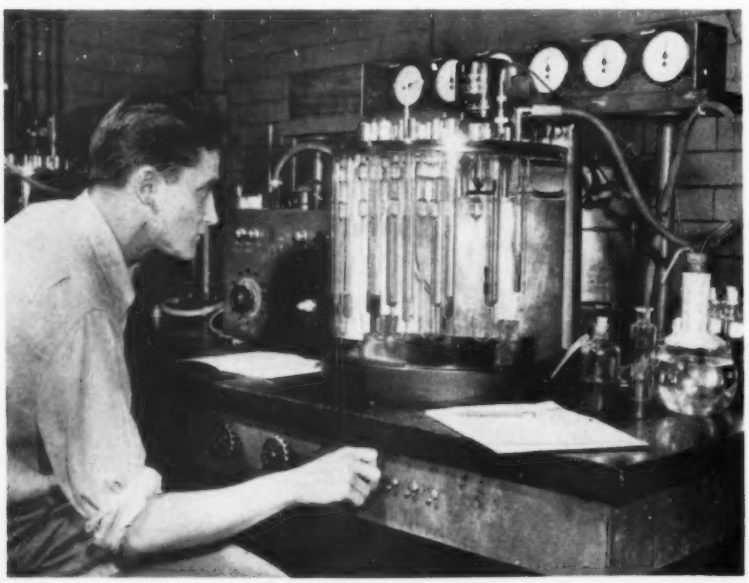


Fig. 1. Technician tests samples for viscosity in constant-temperature bath

Flash and Fire: Measures, roughly, the tendency of a lubricant to vaporize. Lubricating oils do not pose fire-hazard problems; hence, the test is of little value to the plant engineer.

Viscosity: This is probably the most important property and is defined as the measure of resistance to flow. It is evident that unless viscosities are kept to a minimum value, much power will be lost in overcoming viscosity effects in a given system. On the other hand, if the viscosity is too low, excessive friction between metallic surfaces will result.

Viscosity Index: This is a measure of the change of viscosity with change in temperature. High V.I. oils do not change as rapidly in viscosity for a given temperature change as low V.I. oils. Where the operating temperature range of a piece of equipment is very wide, the higher V.I. type oils are desirable. If the operating range is not abnormal, then V.I. is of little value.

Color: The colors of lubricants are generally classified as to transmitted or reflected light colors. They range from very light to dark. Color is not

About the Author

Bruce M. Dunham is a graduate of the University of Cincinnati, with a degree in chemical engineering. Following his graduation, he joined the Kendall Refining Company, in Bradford, Pa., as a research and development chemist, working there until 1941. After five years in the Armed Forces, he joined the Sun Oil Company in Philadelphia, as a Technical Consultant in the Industrial Products Department in 1946, and has held this position to date.

He is a member of the Society of Automotive Engineers, and the American Society of Lubrication Engineers.

necessarily an index to stability. For most lubrication problems, color is not an important factor. One exception, however, can be cited—namely, use in the textile industry where staining of fabric may be involved.

Neutralization Number: This is a test designed to measure the presence of either acid or alkali constituents present in the lubricant. Due to refining methods or additive agents, an oil may not be absolutely neutral, but as long as the acidity or alkalinity is of a non-corrosive nature, it is not harmful. This test does, however, have useful application in predicting periods for oil change or equipment inspection providing the nature and source of the oil is known.

Carbon Residue: Originally developed for the purpose of forecasting carbon-depositing characteristics of internal combustion engine oils and is still useful in evaluating high compression motor oils for pre-ignition tendency. It is of questionable value in judging carbon forming tendency of oils used at ordinary temperatures experienced in most industrial applications.

Pour Point: This test gives an indication of the temperature below which an oil will not flow adequately in service. Obviously, in any lubrication system, anything which may prevent the lubricant from reaching the point where needed is objectionable. Therefore, pour point is important to consider if any system is to be subjected to sufficiently low operating temperature conditions that the oil may congeal.

In addition to the above tests, several others have come into prominence particularly since the advent of additive type oils which do bear significance from a practical service standpoint. Some of the more important ones are listed in Table I.

Significance of Specifications

Table I represents a guide to the practical significance of lubricating oil specifications as related to various universal applications in industry. The various specifications are listed and rated in three categories, namely: (1) important, (2) secondary, and (3) little or no significance, based upon the specific utility of the oil. Anti-rust, anti-corrosion, anti-foaming characteristics and adequate oxidation stability are important in continuous use applications. Here, the oil must lubricate moving parts for comparatively long periods of time to afford trouble-free service with maximum protection to the equipment.

Satisfactory demulsibility (water separation properties) is desirable where abnormal quantities of water may enter a system. Extreme pressure characteristics are vital in units operating under high unit pressures. Such extreme pressure lubricants should also be non-corrosive to the type metals incorporated in the equipment. Detergency is important to offer the best service in high speed internal combustion engines and in some cases where continuous external contamination is prominent in industrial circulating systems. Saponification value is applicable to lubricants containing animal or vegetable oils or fats incorporated for specific functions. An example would be compounded cylinder oil for steam engine cylinder lubrication. Specific significance of these tests are:

Anti-Rust: The ability of an oil to protect ferrous parts against rusting in the presence of water is a most desirable function. Some straight mineral oils exhibit most satisfactory protection due primarily to the presence of natural retardants of such chemical action. Anti-rust type additives have come into prominence in recent years which when incorporated into lubricating oils give exceptional rust-preventive assurance. This feature is most important to reduce wear and replacement of parts in industrial machinery.

Oxidation Stability: When a mineral lubricating oil breaks down in service it may form sludges, resins, varnishes, corrosive or non-corrosive acids or it may increase in viscosity. The extent to which one or more products of deterioration forms depends upon the quality of the oil, the time used and the temperature to which it is sub-

Table I. Relative significance of various specifications for lubricating oils in applications common to industry

Lubrication Specification	Turbines	General Lubrication	Hydraulics	Circulating Systems	Gear Boxes: Worm	Gear Boxes: Hypoid	Gear Boxes: Other	Spindles—Machine Tools	Ways	Electric Motors	Internal Combustion Engines	Steam Engines & Pumps	Air Compressors
Gravity													
Flash point											○		○
Fire point											○		○
Viscosity	●	●	●	●	●	●	●	●	●	●	●	●	●
Viscosity index			○	○							○		
Color													
Neutralization number													
Pour point		○	○	○	○	○	○			○	●	○	○
Carbon residue											●		○
Anti-Rust	●		●	●	○	○	○	●	○	●	●		●
Anti-Corrosion	●		●	●	●	●	●	●	●	●	●	●	●
Oxidation stability	●		●	●	○	○	○	○		●	●		○
Demulsibility	●		●	●				●		●			
Extreme pressure characteristics					●	●			●				
Detergency											●		
Saponification number					●							●	
Anti-Foam	●		●	●	●	●	●	●		●	●		
Ash													

● = Important Significance ○ = Secondary Significance Blank Space = Little or No Significance

"What makes you think it's an oil leak?"

Table II. Reference chart of lubrication applications and requirements evaluates lube qualities vital to equipment

Primary Specification	Equipment
	General Lubrication
Viscosity Pour	Lubricating parts by oil can, oil cups, wick-feed oilers, bottle oilers and mechanical force-feed lubricators, the oil does its job and is never used again. For such lubrication, high oxidation stability is not required. Viscosity is about the only significant specification. Pour test is not significant except where temperatures may drop below the pour point of the lubricant. Other control type tests are not essential.
	Hydraulics
Viscosity Oxidation stability Anti-rust Anti-corrosion Demulsibility Anti-foam Pour Viscosity Index	Viscosity is extremely important in hydraulic application because the proper viscosity must be maintained at the operating temperature in order to achieve maximum efficiency. Oxidation stability is important to assure the oil does not break down to form sludges or gums which would interfere with the controls or that acid formation, which may deleteriously affect the metallic parts throughout the system, does not take place. Anti-rust protection is important. Pour point and viscosity index are only important in special cases where there is a wide operating range of temperature. Except in special hydraulic systems where fire hazard is a possibility, flash and fire tests are of no particular significance. Color, gravity, and neutralization number are not relevant.
	Turbine and Industrial Circulating Systems
	The same general comments apply as outlined under "Hydraulics."
	Gear Boxes
Viscosity Stability Anti-rust Anti-corrosion Film strength Anti-foam	Lubricating oils operate under continuous use application in gear boxes and, therefore, should embody good stability characteristics, anti-rust, anti-corrosion and proper viscosity. Gears other than worm or hypoid generally operate well on straight oils unless abnormal or shock loading is a factor. Worm gears require heavy oils, either compounded or containing extreme pressure additives. Hypoid gears require extreme pressure type oils. Pour point is only important where units are subjected to low temperatures. Gravity, flash, fire, carbon residue, neutralization number and color are of no significance.
	Machine Tool Ways
Viscosity Anti-corrosion Anti-rust E.P. Oiliness	Machine tool ways require a special lubricant to eliminate the possibility of alternately sticking and slipping. The three most important considerations of the lubricant are viscosity, extreme pressure and oiliness characteristics. If the viscosity is too heavy, tolerances cannot be maintained properly, if too light the oil film is broken and stick-slip occurs. Other specifications are of minor consideration.
	Air Compressors
Viscosity Carbon	Here viscosity is important because the proper body of oil is required to keep metallic surfaces apart, especially in the cylinder section. Carbon residue is of some importance, since carbon build-up will cause sticky rings and malfunctioning valves. A light fluffy carbon is preferable to a hard brittle type. Therefore, naphthenic base oils are best. Viscosity index is not important because this is a once-through application. Generally pour test is not important because operating conditions are carried on above 40 F. Gravity, flash, fire and color are not important.
	Refrigeration Compressors
Pour Floc Test Viscosity Low V. I. Oxidation Stability	In this application pour test is very important. Any wax formation separating from the oil will interfere with operation of the expansion valve and other parts of the system, and it is paramount that the pour test and floc test be well below the lowest operating temperature. Proper viscosity is important to minimize friction. Flash, fire, gravity and color are unimportant. Viscosity index is important simply because it insures the use of highly napthenic oils with their inherently low pour and floc tests, which are considered essential. Oxidation stability is especially important in hermetically sealed compressors.

Fig. 1. Part of conveyor as it plunges underground to enter paint chamber

Half-Mile-Long

THE LONGEST continuously moving line of its kind capable of flow coating 6400 Navy jet plane parts an hour is in operation at the Torrance, Calif., facility of Douglas Aircraft Co.'s El Segundo Division.

This automatic paint line is an electrically-driven overhead monorail system nearly half a mile long. It can be operated at speeds of 10 to 30 fpm.

The conveyor dips into five different production locations to receive without pausing, loadings of newly formed sheet metal airplane parts.

At one point the conveyor plunges underground into a 378-ft tunnel divided into chambers. Here the parts move through a dozen different automatic phases, such as washing, rinsing, drying and chemical treatments.

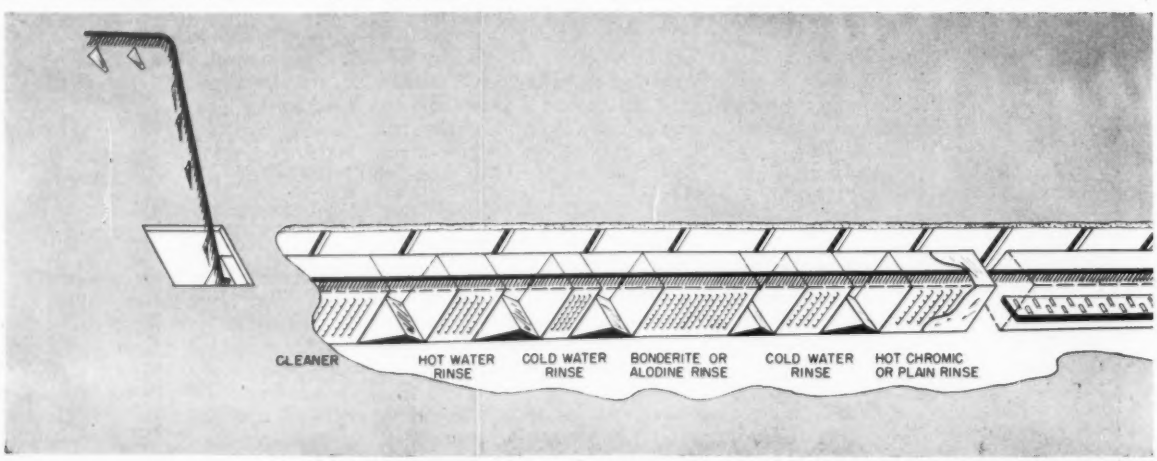
The advanced-type painting system can accommodate parts a square inch in size to as long as 6 ft. They are hung on squeeze-type loops suspended from hooks fixed at four-inch intervals along the roller chain of the 2100-ft steel monorail.

The system employs the principle of flow coating. At a low pressure the paint is slushed on the parts with a fan-like action from banks of nozzles on the sides and bottom of the processing chamber.

The flow-coater utilizes 30 to 40 gal of zinc chromate primer on the two 8-hr work shifts on which it is being operated at present. Agitation necessary in dip coating is supplied in the flow coating process when the paint is pumped from the sump to the nozzle banks.

If a fire should break out the system automatically stops, all fans and

Fig. 2. Schematic diagram of the paint processing line at the Torrance facility of Douglas. Left to right, parts descend to



Monorail for Flow Painting at Douglas

blowers halt, the paint flow turns off, heat sources are killed. At the same time carbon dioxide discharges into sumps and all closed drains.

In operation a shop work order is enclosed in a tube and hung on the conveyor line. Parts are hooked on from any one of the five loading stations by employes. The monorail curves sharply upward as it leaves a loading station to afford work space underneath. Overhead the line is safety guarded by screens.

The following lists in detail each step parts undergo after entering processing chamber:

1. Alkaline spray cleaner; 2. Hot water rinse; 3. Cold water rinse; 4. Alodine No. 1200; 5. Rinse; 6. Hot chromic acid; 7. Through 60 ft oven served by blowers where 450,000 btu are delivered from 100 lb steam (about 250 F) at 17,000 fpm; 8. Cold air blast; 9. Flow coat booth. A complete absence of atomized action due to low pressure and specially designed nozzles; 10. Rise to first floor level elevated position where drying oven maintains 190 F. This heat automatically shuts off whenever line stops because temperature must not be built up, it being too close to annealing limits; 11. Line next dips to central unloading area where parts are inspected and distributed to assembly or to stock along with work order; 12. The line then rises to overhead stripping chamber where hooks are cleaned of accumulated primer before continuing into the loading sequence.

The flow coat paint system is a product of Industrial Systems, Inc., of Los Angeles, California.

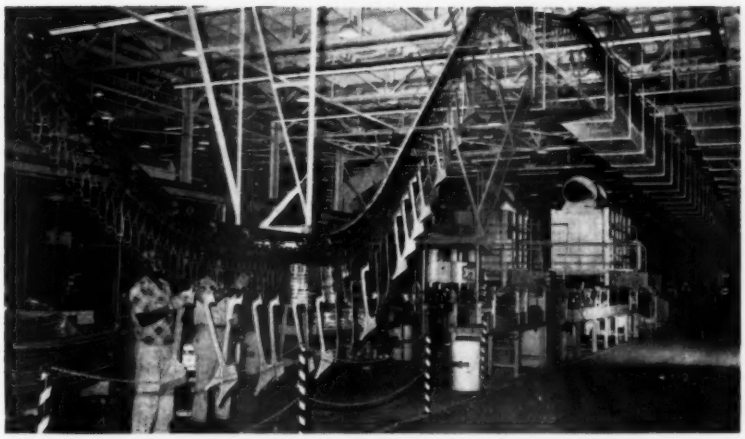


Fig. 3. Here workmen load jet aircraft parts of the flow coat paint conveyor at one of the five loading stations in the sheet metal department at Torrance

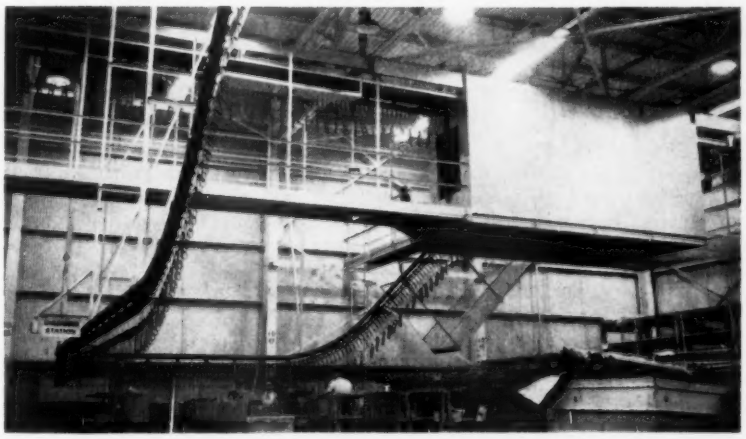
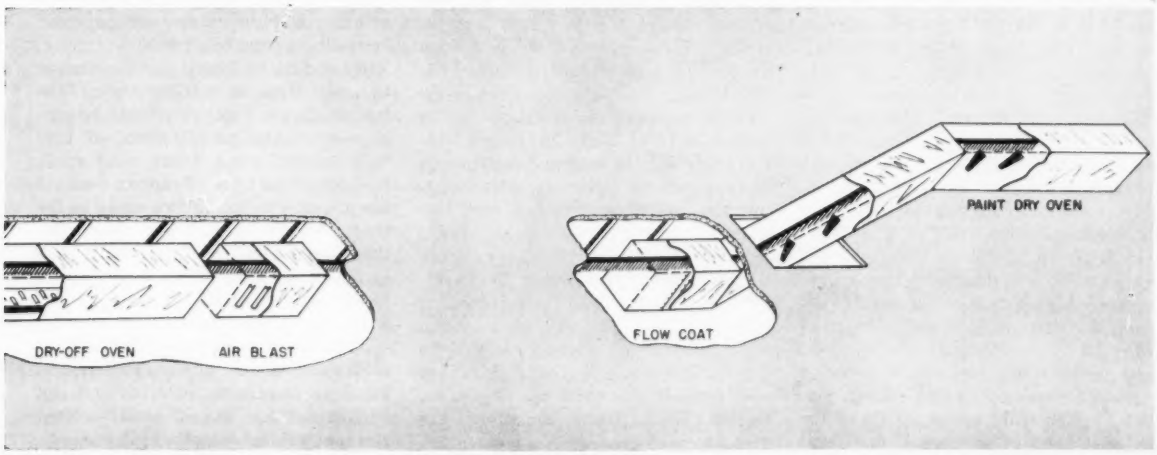
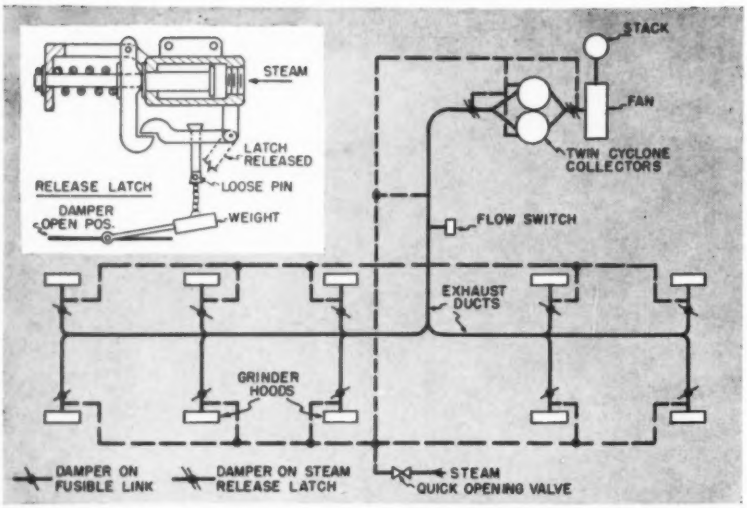


Fig. 4. Overhead drying oven is located at the ceiling. Parts enter and are dried before dropping once again to the floor level for unloading and final inspection

underground chambers and progress through cleaning and flow coating and then rise for the paint drying oven and inspection





Flow diagram of steam-quenching system in ducts. Inset, release latch detail

Blanketing device fills "hot" exhaust duct with steam . . . Fire is held in check . . . Protection is sometimes short-term, but always speedy

"Temporary" Fire Protection Holds Its Own Until Help Arrives

By **GEORGE H. SMITH**, Engineering Dept., B. F. Goodrich Co.

SHUTDOWNS THAT ARE the result of fire and fire damage are costly, far beyond the immediate cost of repairs. Insurance does not cover hidden losses, such as delivery delays, customer dissatisfaction, schedule mix-ups, and lost time to the workers.

In many industrial plants, there are processes in which the hazard does not warrant expensive automatic fire equipment, yet a part-time or "possible" hazard does exist. An example of a "possible" hazard is a dust-collecting system handling flammable material. Although safe under usual conditions, if the belts driving the exhaust fan slip, and the ducts fill up, a dangerous fire condition exists. Once an alarm is in, the plant protection forces or local Fire Department require time to arrive at the scene and get fire-fighting equipment into action. It is in this interval that small fires can become large and costly. The problem is to use this interval to extinguish or hold the fire in check.

A successful attempt to solve this problem has been made at The B. F. Goodrich Co. in Akron, Ohio. A typical example is a dust collection system serving high-speed grinders in a department that produces rubber-covered rolls for typewriters, printing presses, and similar equipment. The finish grind produces hot, sticky rubber particles which build up on the lip of the exhaust hood in spite of high velocities maintained at the hood entrance.

Occasionally, when grinding a "hot" compound, a burning particle is projected into the build-up and immediately covered with other particles. This covering of rubber acts as insulation and fuel. When this chunk breaks off the hood and is carried into the exhaust system, a fire occurs if it meets any accumulation of rubber dust in the ducts before it burns out.

Duct and collector fires are extremely difficult to extinguish, due to lack of access and favorable draft conditions. To combat these conditions, a system (shown in the sketch) has been devised.

In each branch duct, near the riser from the hood, a fire damper was installed. These dampers are held open by a low temperature fusible link. Their function is to isolate fires in the individual risers where hot, sticky rubber is most likely to collect. Installed in both the inlet and outlet ducts of twin cyclone collectors, thus isolating the collectors and fan, are two heavy, tight-closing dampers. These dampers are operated by release latches, which are actuated by steam-flooding system. This steam-flooding system is a simple, dry pipe system connected to each section isolated by the dampers. Control of the steam is effected by the quick-opening valve, located within easy reach of the grinder operators.

At the first sign of fire, the steam valve is pulled. Immediately, the dampers on steam release close, steam floods all sections of the system, and the grinders are shut down by a flow switch in the main duct. Additional dampers, operated by fusible links, also close when the steam hits them. Thus, within seconds of discovery, effective fire control is in action. The fire is often extinguished, but if not, it is held in a passive state and localized until plant protection forces can reach the scene and activate standard fire-fighting equipment.

The installation is essentially simple and relatively cheap. For most systems, one-inch and half-inch pipe are suitable, and the release dampers can be made by any sheet metal contractor. They should be heavy and have stops to make them reasonably tight. The latches shown in the sketch can be purchased from a manufacturer of fire-fighting equipment (ours were made by American La France Foamite Corp.), or similar latches made in the shop. If the latches are purchased, the spring which holds the latch normally closed should be removed and a lighter spring used, for they are intended for high pressure CO_2 systems.

This steam-flooding method can be utilized for almost any exhaust system handling flammable material, and can be adapted for use in small solvent storage cabinets and similar areas.

Improvised Muffler Reduces Engine Noise in Test Lab

Because the dynamometer test laboratory is located near a busy street intersection, it was necessary that the noise from the engines be below the noise level of the street . . . Author tells how his department solved this problem

By V. A. KAHL, Plant Engineer, Moraine Products Division. General Motors Corp., Dayton, Ohio

OUR DYNAMOMETER Test Laboratory, due to a combination of circumstances, was located on a busy street intersection. Because the intersection is in a residential area, adjacent to the plant site, it was imperative that the installation be made to operate at or below the street noise level. As there were to be three internal combustion engines operating at either full speed approaching 4700 rpm or at 36,000 rpm full load, the two problems of dissipating the heat and quieting the noise, had to be considered.

No Data Available

The heat problem was not tough but no available data could be found on breaking down sound waves. Having noted that the exhaust of an internal combustion engine was much more apparent on a cold day than on a hot day, the natural question was, "Why?"

It was finally decided that the hot gases escaping into the cold outside air were rapidly cooled, with a consequent shrinking in volume, thus forming a partial vacuum. The outside air rushing into this partial vacuum caused violent air currents or as the human ear interprets, noise.

From this assumption, it was concluded that if the escaping exhaust gases could be cooled and densified to approximately atmospheric pressure and temperature and dissipated into the atmosphere the problem would be solved.

This assumption led to the thought of expanding the exhaust gases to cool them and then to dilute them with free air before liberating them to the outside atmosphere. The first attempt was so successful that no further improvement was or is planned, as the noise level metered lower than that of the traffic on the adjacent street.

The hot exhaust gases were discharged immediately from the red hot exhaust pipe through a stainless steel conductor into a pipe 16 times the area of the exhaust pipe. Why 16 times the area? It just so happened that the exhaust pipe was 1½ in. in diam and we used a 6-in. pipe as a cooling medium. This 6-in. pipe was hung in an underfloor trench, adjacent to a cooling water line and in our particular installation was from 30 to 50 ft in length, depending on the location of the particular dynamometer cell.

At the discharge end of the 6-in. pipe, four pieces of ½- by ½- by 6-in. steel were welded, equally spaced on the outside of the pipe, parallel to the lateral axis of the pipe. A 16-gage, 3/16-in. perforated sheet was then rolled into a tube to fit snugly over the four strips of steel and extend 8 ft beyond the end of the pipe. The outside diameter of this tube is 7¾ in.

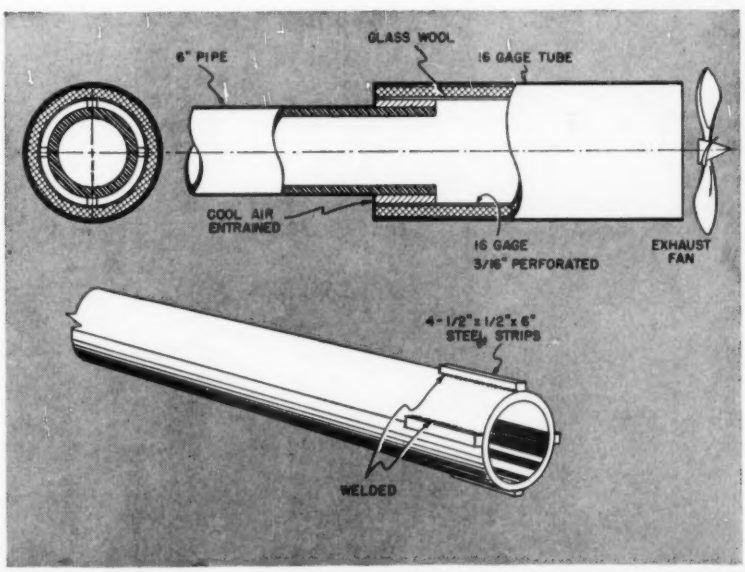
A tube of 16-gage black iron was then constructed. It is 8 ft long, with an 11¾-in. inside diameter and end rings of 7¾-in. bore.

This tube was then placed over the perforated tube, with end rings removed. The space between the tubes was then packed with glass wool, and with the end rings welded in place, we were in business.

The escaping engine gases entrained sufficient cool air through the parts alongside the ½-in strips, welded outside the 6-in. pipe, to cool them. The mixture bouncing back and forth through the perforations and against the glass wool was so mollified that it quit growling.

From the discharge end of this improvised muffler the gases are picked up by an exhaust fan and expelled into a vertical stack which, in turn, discharges the gases above the roof line.

This installation has given satisfactory service for eight years.



Sketch illustrates the muffler parts. This improvised muffler has successfully reduced the noise from the operation of the three internal combustion engines

With a Pull and a Tilt The Old Tank is Spilt

By D. K. HOFFENBACHER, Maintenance Engineer, The Munising Paper Co.
Subsidiary of Kimberly-Clark Corporation

Fig. 1. Old supply tank is being readied for a fall. Cables (arrow) are in position

An overhead water tank and its supporting structure, if unsound, are potentially dangerous to life and property . . . Here is how the job of eliminating this type of hazard was done for one company following an unfavorable report on an inspection of tank and steel

AFTER YEARS of service, the the 50,000 gal, 180 ft high steel water tank at Munising Paper Co's plant in Munising, Michigan was becoming worse for wear. Its condition as well as that of the supporting structure was questioned and arrangements were made for an inspection by an outside firm, Chicago Bridge and Iron Co. The report that was submitted showed that the tank was structurally unsound.

Following this finding, the staff engineering department of the parent company, the Kimberly-Clark Corporation, in conjunction with W. R. Beerman, Plant Engineer, reached a decision to replace the structure and tank as soon as possible, and during the waiting period to carry the tank at half capacity to reduce the load on the weakened members.

While the new tank was being fabricated, serious thought was being given to the safest and most efficient method of removing the old structure. A piece by piece removal was discussed first but this was considered not worthwhile after determining that the steel had only scrap value.

Since nothing needed to be saved, it was decided that a complete collapse of the entire structure would be most effective from a cost standpoint.

Following the erection, testing and certification of the new 100,000 gal tank, water from the old tank was drained to the sewer. Upon arrival of the rigging crew the area was roped off and the direction of fall determined.

It is hoped that a review of the step by step procedure gives the reader a good picture of the over-all demolition job. First, the tank standpipe was cut just above the roof of

Fig. 2. Cable tension starts movement

Fig. 3. Strange behavior takes place

Fig. 4. Cars seem to be in way of fall

the concrete block valve house, Fig. 1 (arrow). Next, a rigger climbed to the top of the supports carrying a snatch block and rope which was used to pull up two ⅝ in. cables. Each of these was attached to one of the legs facing the direction of the anticipated fall. The point of attachment was just below the tank catwalk. The other end of each cable was hooked to an engine driven winch mounted on a pickup truck located 200 ft away.

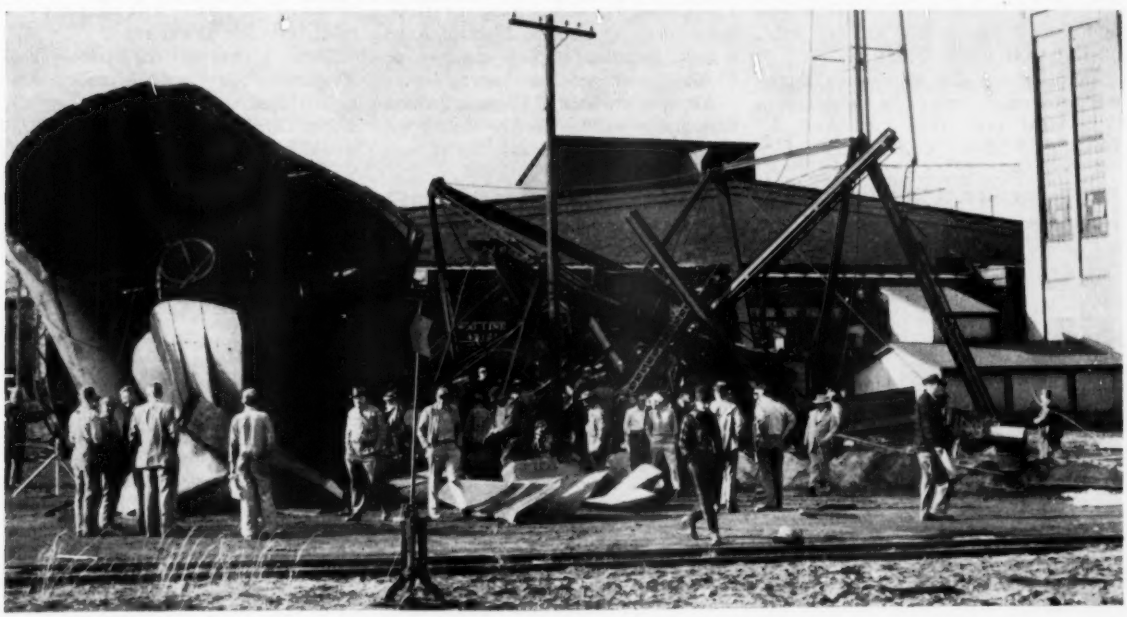
Then a worker with a torch climbed the back legs of the structure as high as the second bent, where he flame cut them as well as the X-bracing rods.

With the preliminaries out of the way, the winch began to take up the slack in the cables. When tension was applied, the tank began what was expected to be a normal fall, Fig. 2. However, the extreme weakness of the front legs caused a strange unique drop. Failure of these members came at the third bent rather than the second, Fig. 3. As a result, the remainder of the tank structure came down almost vertically.

The rigging and dropping of the tank took the crew of three men approximately one day and was accomplished so smoothly that no question remained but that the proper method was used.

An interesting sidelight in connection with the new tank that was put up was the use of a scale model. One of the corporation engineers involved in the procurement of the new tank constructed an 18 in. replica for use in a model railroad project. Since it was available, this scale model was utilized for the study of letter size and arrangement of company name to be put on the new tank.

Fig. 5. The big wrecking job is done. The tank and its structure have become just another scrap pile ready to be removed



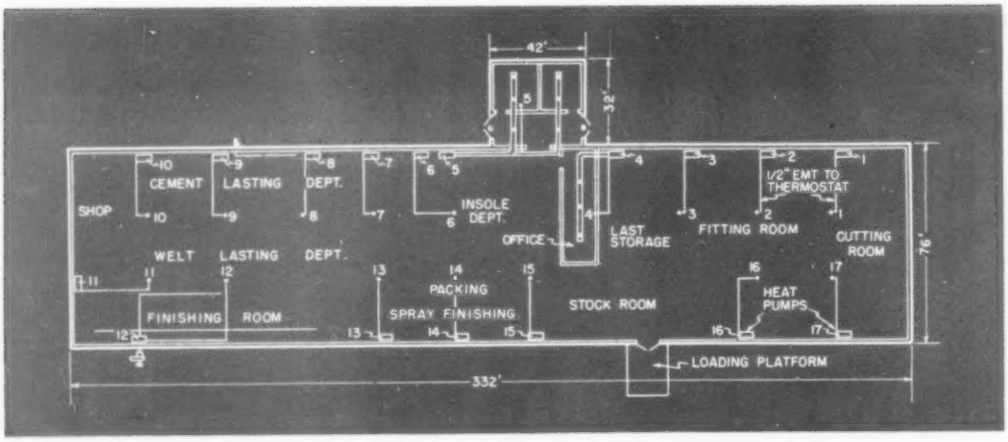


Fig. 1. Floor plan of Virginia Shoe plant showing location of heat pumps, thermostats for zone control

Heat Pumps Cut Costs at Virginia Shoe Co.

INFLUENCED BY several factors, namely a good power rate from the utility, better employee morale due to improved working conditions, plus good processing conditions, Virginia Shoe Company has installed 17 air-to-air heat pumps of 5 tons capacity each to heat and cool its new plant in Fredericksburg, Va. The company had good reasons, they point out, for installing heat pumps instead of a conventional central type heating and air conditioning unit. If the central unit had to be taken out of service for any reason the plant would be without air conditioning. As the system is now designed three or four of the present units can be down at the same time and it will not seriously impair production.

In designing the installation there were several factors to be considered: 1. Heat gain from employees. 2. Heat gain from other equipment; there are 132 fractional horsepower motors in the plant; there is a total of 29 kw of resistance heaters for gluing and drying operations. 3. Air loss from the plant through a large exhaust system installed to carry off dust and shavings. 4. A constant relative humidity had to be maintained, because of process requirements, and at the same time a constant temperature was necessary. 5. Zone control or central control? Shape of the building, as shown in the floor plan, lent itself well to zone control.

The air conditioning was designed on the basis of 95 F dry bulb, 78 F wet bulb, which is standard for the Fredericksburg area. The seventeen units, made by General Electric, have a total installed cooling capacity of 85 ton of refrigeration.

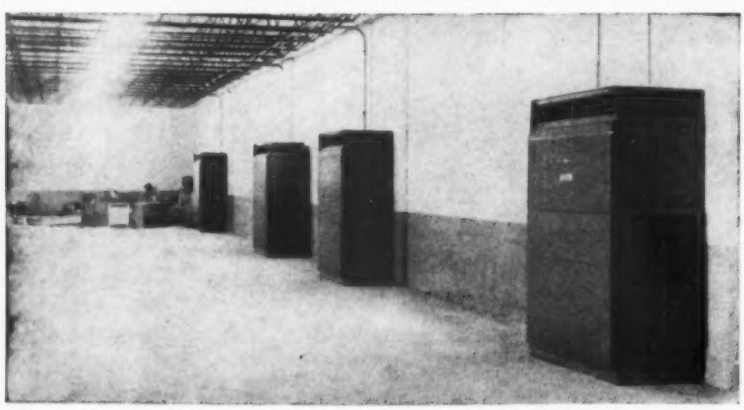
All units are located in space around the outside walls with five inches between the units and walls. Short stub ducts supply each individual unit with outdoor air.

In winter, air-source heat pumps extract heat from this outdoor air, pumping it into the building being heated. In summer they reverse themselves automatically, extracting heat from indoor air and pumping it outside. No water is used.

The local utility estimated the annual cost for heating and cooling the Virginia Shoe Company to be about $2500, a 30 per cent advantage over a conventional fuel-fired system. This advantage is due in part to the all-electric nature of the factory. The boost given its power load by the use of heat pumps assures it receiving the most favorable power rates.

Data given in the table show Virginia Shoe Company's total connected load, rate received from the public utility, and what the rates would have been without heat pumps.

Fig. 2. One view of heat pumps, EMT leading to thermostats is visible on wall



Data on connected load and rates

	Without Heat Pumps	With Heat Pumps
Total connected load[1]	282 kw	498 kw
Kilowatt demand	150 kw	236 kw
Rate: Average cost per kwhr.	2c	1.7c
Cost per kwhr for heating[2]		1.4c

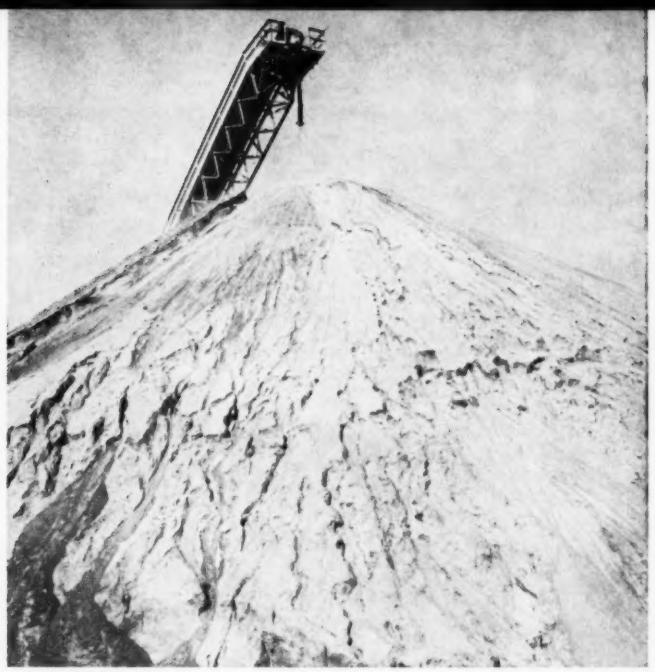
[1]215 hp motors to operate plant
17 ht pumps, 5 hp ea, 6.75 kw max. demand
17 supplementary heaters, 6 kw each
20 kw fluorescent lighting
22 kw incandescent lighting
25 kw resistance heaters
498 kw connected load total

[2]This lower cost per kwhr includes demand charges.

Check List for Users of Industrial Rubber Hose

These few hints may help lengthen life of hose in your plant, increase its usefulness

By J. A. MULLER
Executive Engineer, Thermoid Co.



USERS OF RUBBER HOSE can get longer life and more satisfactory performance by applying this check list to each hose in their plants.

1. Material Carried—If the hose carries any kind of petroleum product, the tube should be compounded to resist attack by oil, grease or gasoline, for example. There are several standard hose types available designed for this type of service. Paint and insecticide spray hose must be built to resist the various solvents incorporated in the new paints and insecticides. Many kinds of dilute acids can be carried by rubber hose but the user should make sure that the hose he is using is designed for the acid. Solids carried either dry or in a slurry require that the tube of the hose be composed of pure gum rubber type to resist abrasion.

2. Hose Size—Is the inside diameter adequate to carry the volume of material required? Too small a hose means excessive pressures will be developed or that less than the required amount will be carried. Too large a hose means higher cost than necessary, poor flow.

3. Pressure—Is the hose designed to take the pressures imposed? Are you using higher pressures than you need to, which results in excessive hose cost? Is the pressure constant or is it pulsating? Pulsating pressures should be avoided. Is the pressure positive or negative—under vacuum or suction? Suction hose requires a spiral or ring type reinforcement in the carcass to prevent hose collapse under suction.

4. High and Low Temperatures must be watched. High temperature applications require special rubber compounds or other heat resisting material in the carcass. Running both hot and cold material through a hose should be avoided. Constant heating and cooling may cause cracks to develop in the rubber tube and cover permitting direct attack on the carcass. As far as possible a hot steam hose should be drained after use.

5. Solids—If solids are carried in the hose, what are their relative size and abrasiveness? Abrasive material in an aqueous solution requires a pure gum rubber tube. If the solids are carried in a corrosive liquid, the tube must be compounded to resist attack by this liquid and a compromise hose results.

6. Bending Limits—Know and observe bending radius limits of your hose. The most common fault is suspending hose off the floor or ground by metal projections with too little bearing area such as nails. Avoid the use of nails because of their small diameter. In addition to unnecessarily bending the hose at these points, the cross section of the hose is reduced. Resistance to flow is increased, unnecessary turbulence is set up. Use saddle type supports with adequate bearing contact with the hose.

Put supports close enough together so that hose weight is evenly distributed, so that large hanging loops do not affect flow of material, so that hose is not strained by supporting too much of its own weight.

When the hose is regularly flexed as in reciprocal hydraulic applications, bending radius limitations should be watched most carefully.

7. Length—Obviously a hose system should be designed to avoid stretching. This weakens the hose and puts unnecessary strain on the coupling. Too much length runs up the hose cost and permits snagging and kinking.

8. Twisting—Avoid twisting or torsional strains, especially in short hose lengths. Twisting will tend to separate the reinforcement from the tube and cover. It may even seriously disarrange the reinforcement. In a wrapped hose in which the reinforcement is cut diagonally to the warp of the fabric, twisting may weaken the structure.

9. Cycle of Operation—Many hose do the same job at the same pressures and temperatures twenty-four hours a day without valves being shut off and on. Other hose may be subjected to an extremely vigorous cycle with many sudden interruptions in flow, long periods of idleness, wide temperature variations and changes in environment.

In many types of hose service, the position of the hose is changed frequently. More often than not, it is dragged from place to place. An abrasive resistant cover is needed.

When hose is not to be used for a long time, it should be drained, wiped clean of oil or grease and stored in loose coils, preferably flat on the floor, inside, out of the sun.

10. Couplings—Are the correct types of couplings being used? Are they correctly installed? Are they properly maintained? Tightened periodically? Checked for leaks? If service requires frequent disconnecting, are the couplings designed for easy, fast disconnecting?

11. Protection Against Accidental Damage—In hazardous areas, are hose protected against damage from falling rocks, from heavy vehicles at hose crossings? Is the hose kept out of strong sunlight as far as possible? Do you have an adequate stock of spare hose and couplings?

12. Working Conditions—In many cases the ambient temperature and pressure must be considered. The temperature of the room in which the hose works must be added to the temperature of the material being carried.

Photo: Hercules Powder Co.

View of the plant's processing area. The ceiling, brick side walls and metal work, including steel tank, shown on wall in background, and piping are finished with a chlorinated rubber base paint. The vessels are stainless steel, but all other metal parts are painted with this acid and alkali resistant paint to reduce wear

Chemical Fumes Can't Hurt This Paint

With equipment in this chemical plant continually exposed to alcohol spillage and fumes, it was important to use a paint that would withstand such exposure and frequent cleanings . . . A chlorinated rubber base paint was the answer

QUITE OFTEN plant engineers are faced with a choice between appearance and protection, and must sacrifice one for the other. However, with the development of a system of plant finishes based on Parlon (chlorinated rubber), it is now proving possible to obtain colorful and durable protective coatings with resistance to a variety of chemicals, acid fumes and moisture conditions.

An example of how these chlorinated rubber paints offer both appearance and protection, especially in exposures involving acid and chemical fumes, is in the chemical plant of the R. K. Laros Co., Bethlehem, Pennsylvania. This plant processes dextran, the material which in its clinical form is used as a blood volume expander in place of whole blood plasma. This new synthetic has proved useful in emergencies, where the normal supply of natural blood plasma available has been insufficient to meet the demand.

In a plant of this type, it is necessary that the facilities not only be clean, but appear clean. Every effort is made by management to maintain an atmosphere of cleanliness and sanitation comparable to a hospital operating room. This was accomplished despite the fact that the building has a variety of different textures, many of them difficult to paint properly.

Among the various trying exposures to which any paint used would be exposed were alcohol and hydrochloric acid fumes and the cumulative fumes of the various chemicals involved in the processing of dextran from sugar. Nevertheless, a single type of chlorinated rubber paint was successfully developed for application on such diverse surface textures as wood, brick, concrete and metal, bringing to them all a degree of protection that finds them in almost new condition a full two years after application.

The most significant performance of the paint was in the processing section, which consists of a large area approximately 100 by 100 by 40 ft high with manufacturing operations set up on three different levels. Here, anchorage was obtained on unpointed brick walls, on ceilings, floor and metal work and also on all parts of the processing machinery not made of stainless steel.

Three-Year Test

Two coats of chlorinated rubber were put on in late 1951 and to date there has been no sign of failure in the paint film. Alcohol fumes and fumes of hydrochloric acid are prevalent in this area since both materials are involved in the fermentation, hydrolysis and fractionation of dextran.

Occasionally, touch-ups have been required on the mixing heads of the fractionating tanks where the paint has been chipped off in the process of removing cumulative deposits of dextran. However, even in the area around the roof vents where vapor accumulations are heaviest, the paint film has stood up well in the two years since it was first applied. The entire area is kept in spotless condition by frequent cleanings with detergent solutions.

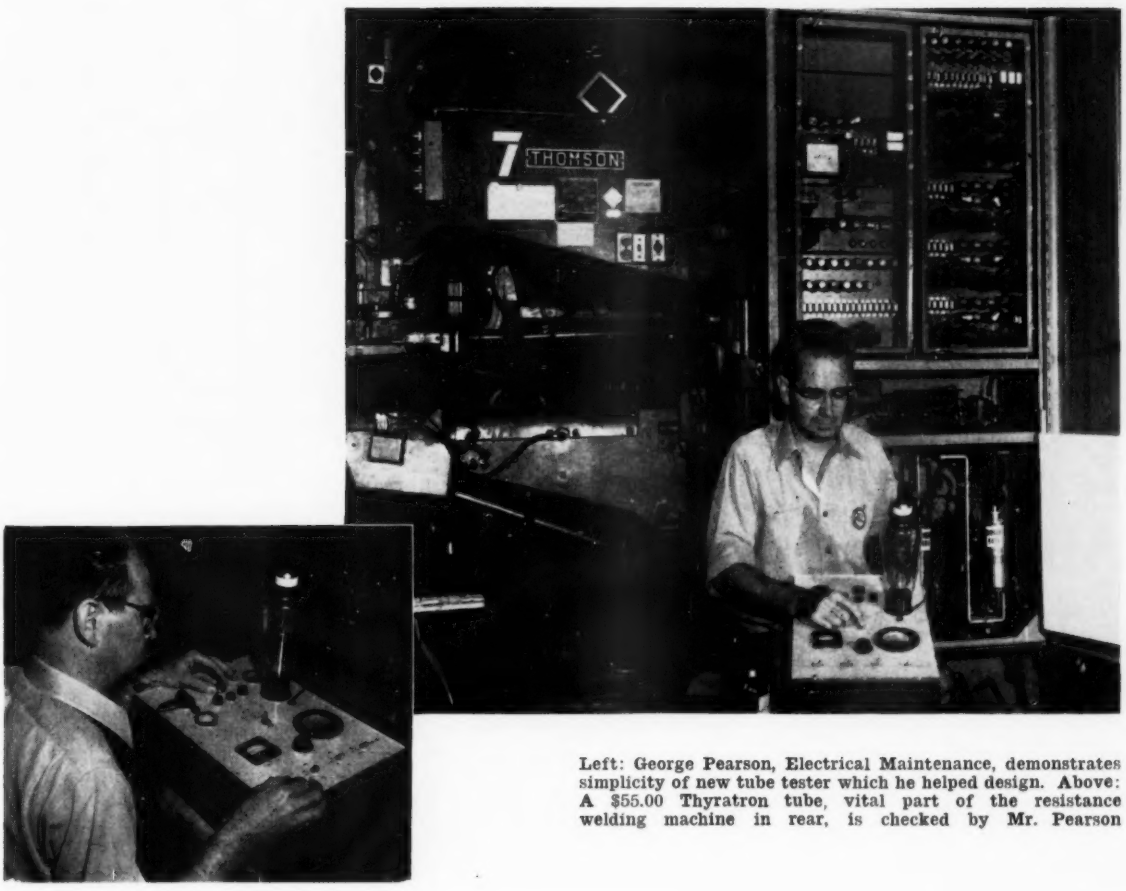
Finishing the spray drying room in the plant posed a number of unusual problems. Since it was desired to put this part of the operation in use as quickly as possible, painting was undertaken immediately after the walls had been freshly plastered. It was important to use a paint that could be frequently washed with a germicidal solution, since this is a most critical part of the synthetic blood plasma cycle, and must be carried on in a sterile area.

Two coats of chlorinated rubber were applied over the bare plaster. Neither attack from the plaster alkali underneath the paint surface, nor constant exposure to washings have broken down this paint film at any point. The room appears as clean and newly painted today as it did when the chlorinated rubber finish was first applied.

Similarly, in the laboratory area, where exposure to vapors and acid fumes might be expected to destroy any paint finish, the acid and alkali resistant coating has given excellent results.

The chlorinated rubber paint used at the R. K. Laros Co. plant is manufactured by Barreled Sunlight Paint Co. It is based on Parlon, manufactured by the Hercules Powder Co.

Home-Made Tube Tester Cuts Welder Downtime



Left: George Pearson, Electrical Maintenance, demonstrates simplicity of new tube tester which he helped design. Above: A $55.00 Thyratron tube, vital part of the resistance welding machine in rear, is checked by Mr. Pearson

ELECTRICAL MAINTENANCE men at Ryan Aeronautical Co., San Diego, Calif., are saving time and trouble with a new tube tester which takes the guesswork out of trouble-shooting. This device is used to test the large Thyratron electronic tubes which are used in all resistance welding machines. At Ryan, where 100 welding machines of this type are in constant use, the tube tester is a valuable tool for pin-pointing tube troubles and reducing machine "down-time" to a minimum.

The instrument was designed by electrical maintenance personnel and fabricated from used, surplus materials. It contains relatively few parts including a transformer, grid circuit, resistors, voltage regulator tube, rectifier, ammeter and voltmeter. The ammeter has been modified to register from zero to 5 amperes. The voltmeter has been altered to register from minus to plus 20 volts. With the new device, Ryan electricians can check the eight types of Thyratron tubes used in welding equipment in the plant.

Thyratron tubes are the largest and most expensive types used in welding machine control panels. They cost between $8 and $55, depending upon their size and type. Called "trigger tubes" by electricians, they are actually electronic switches which control the large amounts of electricity needed to weld metals.

Because tube testers are not available, commercially, for testing these large, specialized tubes, Ryan electricians have had to check them by trial and error methods in the past. A suspected tube in a welding machine was replaced with a new one. If the machine then worked properly, it was assumed that the removed tube was malfunctioning. But it was not thrown away because it might work well in another machine where voltages were slightly different. And, these tubes are so expensive that it was inadvisable to throw them out because they failed to operate in a particular machine.

If the welding machine failed to operate correctly when the Thyratron tube was replaced, then the maintenance man was faced with the question of whether the new tube was good, whether the trouble was elsewhere, or whether both the tube and some other defect were causing the machine's behavior.

To test a Thyratron tube, it is placed in the tester and a voltage of 600 volts is impressed between the cathode and plate. The grid voltage is then varied by means of a potentiometer. Ryan has found that these tubes will operate just as reliably, for test purposes, on 600 volts as they will under actual operating conditions of 2000 volts.

Using the new tester, Ryan electricians have thrown out many Thyratron tubes which were held in storage because of their doubtful quality. Others have been rated so that they may be used in suitable machines.

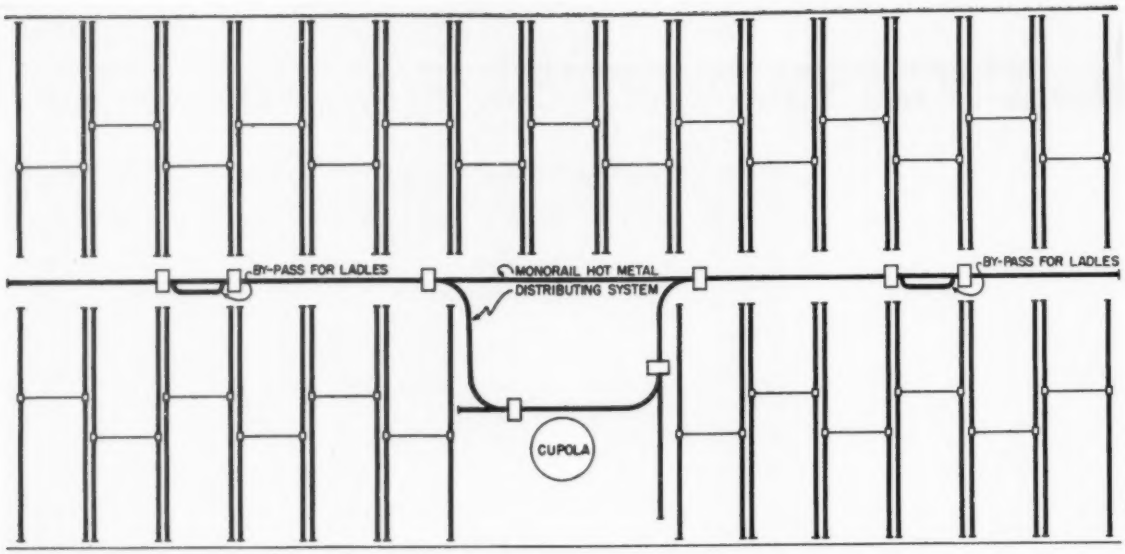


Fig. 1. Drawing illustrates how 27 production areas at LaCrosse, Wis., foundry are served by overhead handling system

Allis-Chalmers Mechanizes Foundry For Fast, Safe Handling of Hot Metal

AN OVERHEAD HANDLING system which transports hot metal from the cupola to individual cranes for pouring at each of 27 production areas has helped Allis-Chalmers Manufacturing Co. increase the production capacity by 30 per cent at its foundry in LaCrosse, Wisconsin.

In addition to mechanizing the hot metal handling, this system has contributed to: (1) More efficient use of floor space. Molds can be stacked higher than formerly possible; (2) Dust reduction because of less floor traffic; (3) An improvement in employee morale and productivity; and (4) Faster, more efficient charging, made possible because a special crane handles it.

Charging the cupola, the first operation in the foundry, is handled by a Trambeam charging crane which has helped to speed up the charging operation. This crane, installed outside the building, lifts a cone-bottom bucket from the pit up to the level of the charging door on the roof, then runs the bucket into the wishbone support in the cupola, where the charge is automatically discharged. The time

Fig. 2. Charging crane lifts cone-bottom bucket with a 2,000 lb charge up the side of the building to roof of foundry

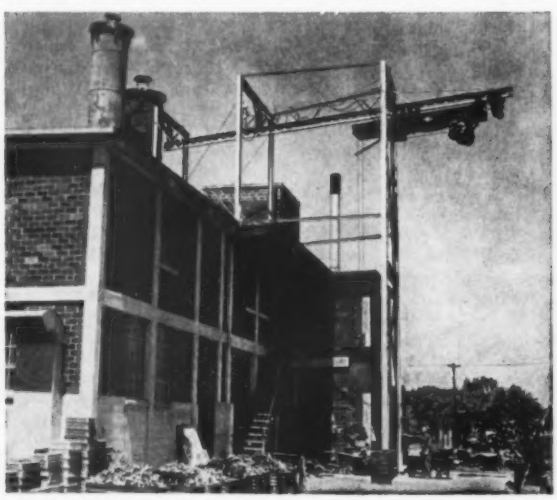
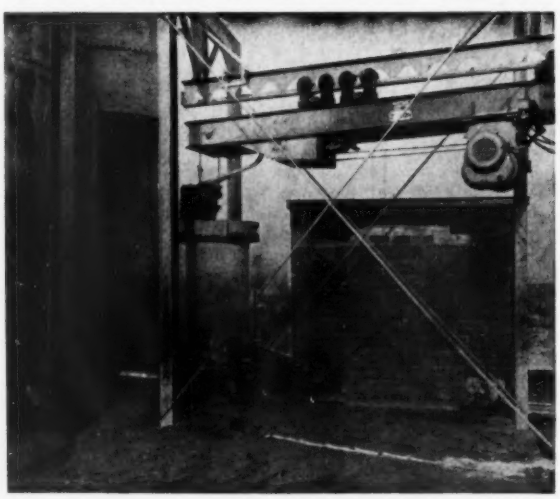


Fig. 3. Close-up view of roof installation shows bucket moving into cupola stack opening to discharge automatically



cycle for a 2,000 lb charge has been reduced to four and a half minutes.

This is a considerable improvement over former methods which required manual loading of wheelbarrows, raising them with an elevator and then hand-charging the cupola.

The new method of charging has virtually eliminated cold spots in the cupola in addition to cutting the amount of coke used by 30 lb per thousand pounds of charge, as well as increasing the carbon pick-up.

When the cupola is ready to be tapped, the overhead handling system inside the foundry takes over. Whiting transfer ladles of 1,000 lb capacity move to the tapping area on a Tram-beam monorail sidetrack which eliminates traffic jams between filled and empty ladles. The filled transfer ladle then moves on the main monorail line to the production floor, where it discharges metal into smaller ladles.

Because of the faster handling made possible with this system there is no need for a reservoir ladle; metal is poured directly into the transfer ladles. Total metal now poured ranges from 35,000 to 40,000 lb in 2 hours and 20 minutes, as compared with a maximum of 25,000 lb in about the same time before the present system was installed.

Former methods involved the use of sulky ladles for transferring the hot metal from the cupola to the pouring floor. Hand ladles were then used for pouring metal into molds.

This monorail-crane system, manufactured by the Whiting Corp., Harvey, Illinois, has been the key factor in increasing production capacity by 30 per cent with the completion of the foundry's expansion program.

Fig. 4. The cupola is tapped directly into transfer ladles which move on the monorail to the pouring areas. Switches and sidetracks eliminate traffic jams

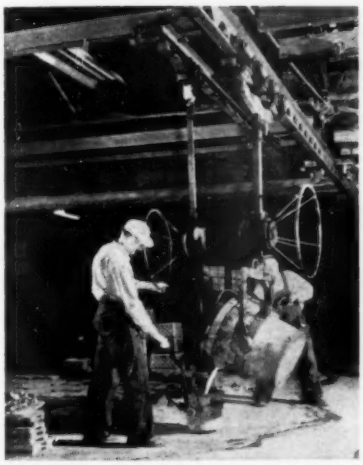


Fig. 5. At each pouring area, transfer ladle discharges metal into smaller ladle

Fig. 6. Mechanized pouring permits higher stacking of plow share molds

Fig. 7. Over-all view of the Allis-Chalmers foundry shows part of the overhead handling system which serves the 27 production areas. At far right, is the monorail line for transporting hot metal from the cupola to the pouring floor

ULTRASONIC INSPECTION — Replaces Guesswork

Plant engineers, with the help of ultrasonic inspecting equipment, can confirm their suspicions of defective parts before breakage occurs . . . This method of inspection can also prove invaluable by discouraging removal of parts which, while suspected of being defective, actually are sound and whole

GROWING COMPETITION and other influences of tightening industrial economics are putting new dollar importances on the continuity of plant operations. They are also placing greater responsibilities upon the plant engineers, and the trend toward automation merely aggravates the situation.

H. F. McCullough, general manager of General Electric's Service Shops Department, estimates that within 10 years industry will double its maintenance expenditures to about $22 billion annually.

Predicting that manufacturing plants will need carefully planned maintenance programs to keep going, he urges that plant engineers exercise management skills to assure the maximum use of machines and to prevent breakdowns from boosting unit costs. He recommends programs of planned and informed maintenance such as techniques revealed by quality control.

Informed maintenance might be defined as such awareness of the physical condition of production machinery as to facilitate scheduling repairs and replacements in advance of trouble and without halting production.

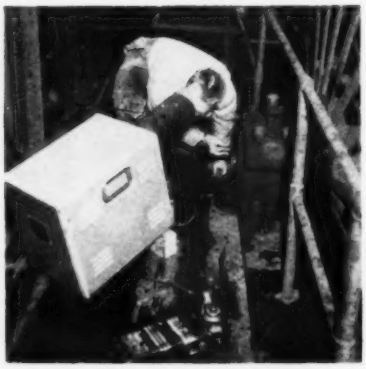
Rejecting faulty material at the beginning of a production run instead of finding these defects during final inspection can possibly mean the difference between profit and loss. For example, a forging worth $100 as received is machined into a part worth $300. On a production run of 1,000, rejection of only 40 defective forgings in advance of machining saves $16,000. In the same way, a timely replacement of a $100 part can prevent wrecking a $160,000 machine.

These production losses are prevented by subjecting raw materials to non-destructive ultrasonic testing. The Reflectoscope, a relatively simple and inexpensive instrument, no larger than a TV set, which it resembles, beams ultrasonic waves through the suspect material and reveals flaws, or structural discontinuities, by typical oscilloscope patterns on a cathode ray tube.

No great technical skill is required

Fig. 2. Disassembly of hydraulic presses can be eliminated by ultrasonic inspection of suspected critical parts

Fig. 3. Ultrasonics is also helpful for inspecting heavy wheels, gears and other equipment in quarries and mines



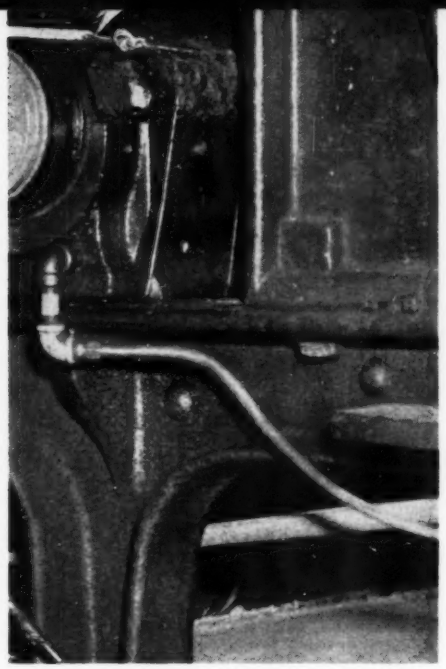


Fig. 1. Left: Operator checks the equipment in a paper mill to detect any possible defects in advance and avoid unnecessary downtime. Above: Here the search unit of the Reflectoscope is used to probe a weld area

With Facts in Plant Equipment Maintenance

in using the instrument. It works as effectively on machine parts as materials. The operator moves a search unit over the surface of the material or part under inspection which transmits the ultrasonic waves. Existence, location and nature of defects are shown by pips on a screen.

Ultrasonic waves can penetrate more than 100 ft of steel. The search unit can detect in a shaft such minute defects as fatigue failures indiscernable by surface inspection, even with a microscope. Moreover, the job is done without dismantling the machine.

Plant engineers who have experienced the frustration of spending days tearing down a machine only to discover that a suspect part was sound, or have been troubled by breakdowns after a suspect part has been examined and found apparently flawless, can appreciate that this instrument could be as helpful to them as a stethoscope to a physician. It renders almost the same diagnostic service and exploratory vision.

This informed maintenance technique certainly is working out in practice. For more than two years Aluminum Co. of America has been examining all Alcoa extrusion presses with a Reflectoscope. Savings in downtime and machine damage alone are estimated at more than $1,000,000. Alcoa maintenance engineers insist that savings are even greater than $500,000 annually because of the prevention of damage to equipment by locating incipient failures.

This technique is not confined, however, to inspection of heavy machinery. Examination of high-temperature, high-pressure pipe by Reflectoscope is established in the petroleum, power, chemical, and other industries whose operations involve extensive use of piping. Search units regularly are applied to couplings, pipe, and other stressed items by The Grinnell Co., M. W. Kellogg, Pittsburgh Piping & Equipment, National Tube, and other companies. They use the instrument not only for inspection, but for measuring wall thicknesses.

Some Reflectoscope operations actually combine materials and machine

Fig. 4. Here, operator places search unit to shaft of power plant equipment and checks reading on the Reflectoscope

Fig. 5. Such inspection ascertains, even before it happens, when something is likely to blow in h-p piping

Fig. 6. Doubts as to the soundness of a tank weld can be easily removed by an ultrasonic inspection of the weld

inspection. For instance, diesel wheel manufacturers troubled by internal rim failures find that ultrasonic inspection not only locates causative inclusions, or shatter cracks, but ascertains their size. The technique is used also for maintenance inspection so that defective wheels may be removed from service before fatigue failures and other defects grow to dangerous proportions.

In this operation, ultrasonic waves beamed through wheel rims are reflected by the opposite face of the rim. Any structural discontinuity is reflected as an echo which creates a secondary pip on the screen.

This disclosure of concealed, incipient fatigue cracks is among the special benefits of ultrasonic inspection. Reports of Mutual Boiler & Machinery Insurance Co., analyzing 200 steam engine accidents, ascribe 32.5 per cent of all failures to fatigue cracks difficult to locate even with microscopes.

The reports indicate that such fatigue cracks customarily start at hidden points of stress concentration, originating with the greater frequency in keyways, fillets, holes, and at the roots of threads. Eccentric rods, valve rods, connecting rod bolts, and crank counterweight bolts usually break in the threads. Piston rod fractures start almost invariably in the threads which attach rods to pistons or crossheads. Shafts fail at points of sudden change in diameter, and where stresses are magnified by holes or keyways.

This instrument is also used for routine testing of steam engine shafts and piston rods, diesel engine crankshafts, hydraulic press columns, and other components, without disassembly.

Another typical benefit of this type of inspection is reported by Chief Electrical Engineer W. A. Black, of the Steel & Tubes Division, Republic Steel Corp. In Republic's Cleveland plant, the top operating unit, a blooming mill, is driven by a 25,000 hp steam engine installed in 1916. Engine age and dependence on its continued operation necessitate frequent inspection of components, since failure could be catastrophic in the crowded working area.

During a recent inspection, the maintenance crew removed bearing caps, checked alignments, and measured wear, finding nothing amiss. However, as a final check, essential components were subjected to ultrasonic inspection which disclosed two extensive stress cracks in the corner of a crankshaft bearing shoulder. Hidden by the crankthrow, they were undetectable by surface indications.

Since management, at that time, lacked confidence in ultrasonic inspection and desired to maintain production, it was decided to continue operations, but with daily checking by Reflectoscope. It was found that the initial cracks grew rapidly and that others formed. Within five days, production was stopped to permit replacement of the 33-ft, 126-ton crankshaft.

The job of dismantling boilers for examination of small-diameter superheater-tubing is one neither managements nor maintenance departments view with enthusiasm. Yet inspection can be performed with minimum difficulty, maximum results, and in limited time, as reported by Chief Chemist J. A. Tash, of Duquesne Light Co., of Pittsburgh, Pa.

Mr. Tash explains that chrome-moly boiler tubes were rupturing on longitudinal seams with annoying regularity in convection superheater outlet sections where only two outer rows could be examined visually. The Reflectoscope located defects in 90 tubing sections involving more than 1,500 ft of tubing. Additionally, the device established these defects as being of manufacturing origin. As a result, the tubing was replaced, alleviating the possibility of serious operating difficulties from the two boilers.

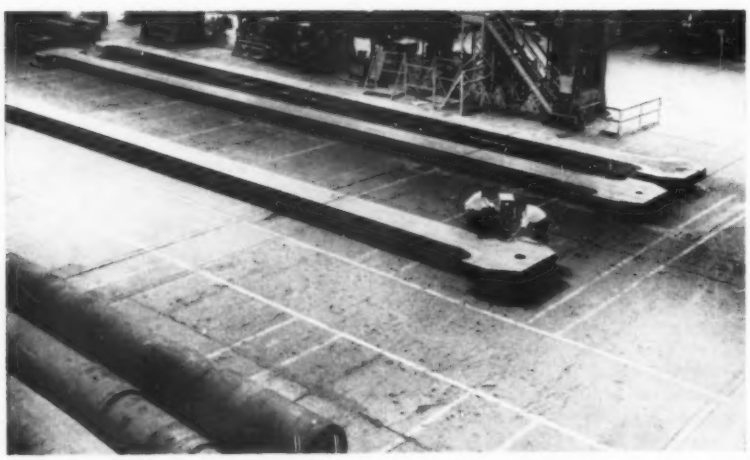


Fig. 7. Sections of 101- and 108-ft vertical columns of Loewy presses are examined for defects while they are assembled at the Wyman-Gordon plant

Inspection of Heavy Machinery

With paper mill machinery, ultrasonic inspection is applied to press rolls, to the shafts of numerous engines, to steel journals, and to other parts. Scott Paper Co. uses the instrument for continual maintenance checks. Other paper manufacturers, among them Federal Paper Company's Inland Paper Board Division, make periodic ultrasonic checks of all mill shafts and components.

Reflectoscope inspection of printing press rolls has been found to be particularly effective in revealing steel and forging defects.

Ultrasonic inspection of press rolls permits the detection of fatigue cracks and periodic measurement of their growth, as well as the identification and location of stress raisers. The ability of this equipment to give advance warnings of pending difficulties not only facilitates replacement of faulty equipment without interfering with normal plant production, but accommodates maintenance of a stock of dependable rolls.

The hard usage to which mining machinery is subjected obviously demands peak maintenance operations. Here ultrasonics serves the good purpose of making in-place inspections without dismantling.

Parts routinely inspected are crank pins, crankshafts, drum shafts, and sheave axles. This is unusually heavy equipment. Shafts range from 8 to 35 ft in length. Axles average 6 in. in diameter. Crank pins are 6 in. through and a foot long. Glen Alden Coal Co., of Wilkes Barre, Pa., makes annual Reflectoscope checks a routine maintenance procedure.

Similarly heavy equipment used in cement mills and quarries once was subjected periodically to lengthy maintenance overhauls. Production had to be halted so that shafts and other components might be removed. The Reflectoscope now permits examination for subsurface and hidden defects without even interrupting normal production.

Of parallel interest and importance to plant engineers is the instrument's capacity for inspecting welds and weldments. Objective here is to ascer-

tain whether bonding is complete, its strength adequate, and welded units fit for service.

The normal straight beam search unit is replaced by an angle beam unit customarily employed for testing thin sheets and plate. With this unit the ultrasonic waves are beamed at various angles to the surfaces to detect discontinuities in the weld. The Reflectoscope is capable also of testing welded seams on the inside of tanks.

Approximately a foot wide, one and one-half feet high, and two feet deep, the 100-pound Reflectoscope is portable and convenient to use. It incorporates an electronic pulse generator, amplifier, sweep generator, and other electrical circuits producing trains of electrical impulses of 5,000,000 cycles per second.

In operation, a piezo-electric search unit, which converts electric oscillations into mechanical vibrations, and back again, and then into light waves, is moved slowly over the part. The ultrasonic vibrations are reflected both by the opposite side of the part and by any crack, flaw, fissure, defect, or other structural discontinuity, regardless of size, shape, or location.

Pattern Indentifies Defects

These electrical impulses converted finally to light waves in the form of a definite pattern on a cathode ray tube, present a pattern showing, at the left, vertical pips representing the initial pulses, at the right end of the screen, pips indicating reflection from the opposite end of part or material, and, in between, pips indicative of structural discontinuities. The nature, size, and behavior of these pips identifies defects by type.

Movable reference markers beside the screen facilitate estimating the location of defects. This calculation further is facilitated by superimposing the pips on a time line calibrated in units of distance. Once the suspect area is defined, defects may be pinpointed, measured, and identified merely by concentrating the search unit's movements.

Since Reflectoscope circuits are designed for automatic operation, training of operators is minimized. Practically speaking, virtually anyone who can tune in a radio or television set, and has normal vision and alertness, can satisfactorily operate the instrument. Once a test system is established, with pip action related to defect types, use for inspection purposes becomes a repetitious technique.

Depending upon the nature of testing requirements, the instrument may be operated at frequencies of 0.5 megacycle to 20 megacycles. Various

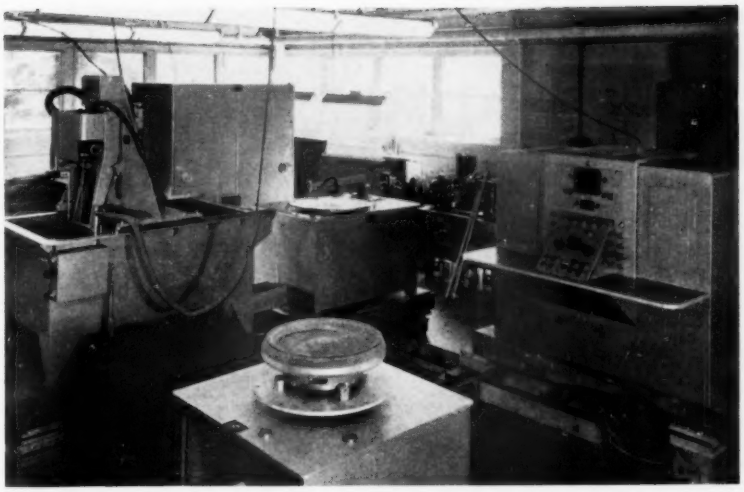


Fig. 8. A recent development is the SIMAC, meaning sonic inspection, measurement and control. It was made by Sperry Products, Inc., for Allison Div., GMC

circuits may be obtained to meet differing situations.

Also available are automatic recording and signalling systems, including photography. A variety of sizes and shapes of the search units readily adapt the Reflectoscope to numerous machine parts and materials.

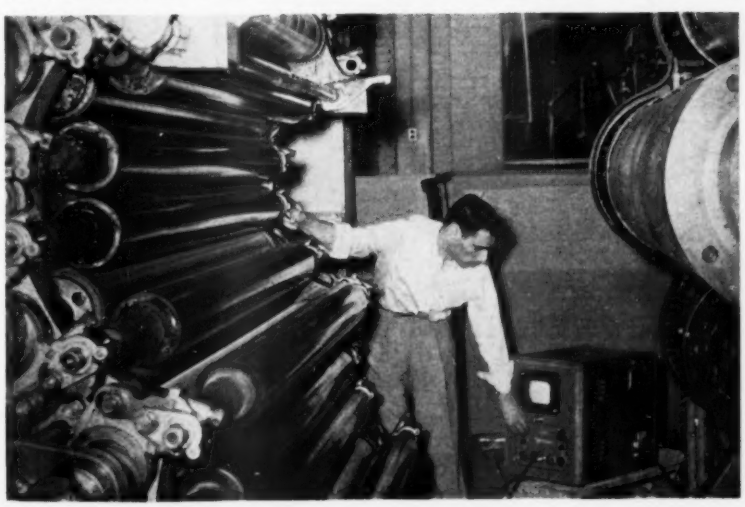
With shafts, the straight beam search unit customarily is used. It has tested through more than 100 ft of steel and aluminum, so that the ordinary shaft offers no problem. Applied at one end of the shaft in place, it reveals defects anywhere in the length. It is particularly helpful in checking reworked shafts for hidden flaws prior to replacement.

An angle beam search unit is employed with thin materials, such as sheet, plate, or tubing, to locate both surface and sub-surface discontinuities. An immersion type unit inspects irregularly-shaped parts in oil or water.

The Reflectoscope is manufactured by Sperry Products, Inc. In fact their laboratory is equipped to develop special inspection instruments for solution of specific industrial testing problems. A recent achievement is the $300,000 SIMAC made for the Allison Division of General Motors Corp. This precision instrument simultaneously applies ultrasonics and digital automation to parts inspection as a production line procedure.

The trends of economics are such that plant engineers no longer can afford the luxury of guessing and hoping that the machinery for which they are responsible is in productive operating condition. They've got to *know*—and ultrasonics tells them.

Fig. 9. Previously, it was necessary to disassemble these printing press rolls for periodic inspection. This is no longer required when inspected by ultrasonics



Industrial Railroad Trackage
II. Ties, Tie Plates and Spikes

By R. A. ANDERSON, Vice President, L. B. Foster Company

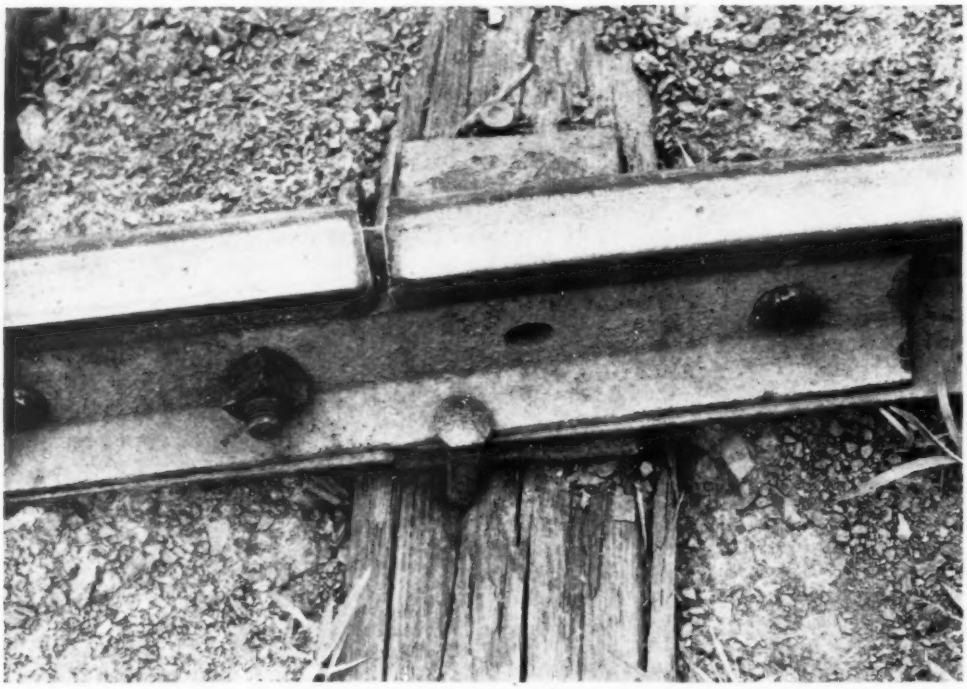


Fig. 1. Old, rotted, split tie completely deteriorated, probably because of poor drainage in that area of track. Weakened condition of tie has resulted in general deterioration of joint

About the Author

R. A. Anderson has been a member of the L. B. Foster organization for seven years, just recently having been elected to the position of vice president. Mr. Anderson is a graduate civil engineer from the School of Engineering at the University of Illinois. He was originally with Company in the Chicago office and had been regional manager there for three years before transferring to the Houston office, his present locale.

IN THE FIRST ARTICLE of this series we discussed the maintenance and repair of the "foundation" or roadbed of the trackage. We now shall discuss the track structure base, the components of which include — from the bottom up, ties, tie plates, and spikes.

It is pertinent at this time to point out that while day-to-day checkup, maintenance and repair are properly part of a plant's normal operations, original design and installation as well as major repairs should be done by experts in the field. In the case of the former, an engineer or firm specializing in trackage work; for the latter, recognized track contractors, many of which belong to the Association of Track Contractors.

Ties form the base of the track structure and act both as the bearing surface and the anchor surface to which the other components are tied. While so-called "substitute" ties of various designs and materials — principally metal or concrete or a combination of the two — have been devised, the standard and most widely used material for tie construction is wood.

Wood ties are either of the treated or untreated type. Treated ties, which mean ties that have been processed with a preservative such as creosote, are more expensive but have a far longer life than the untreated type.

However, unless a track installation is to be in use for five years or longer, the added investment for treated ties is unwarranted and untreated ties are adequate.

Tie Dimensions

Ties are classified according to use as cross ties and switch ties. Cross ties are the basic type and are used under the major portion of the track. Switch ties, as the name implies, are used throughout the length of crossings, crossovers, branch-offs or turnouts, and so forth.

For industrial work, cross ties are used in a standard 8 ft 6 in. length. Switch ties vary in length from 9 to 16 ft, depending upon the configuration and requirements at the particular points of use.

The cross-section dimensional classification for ties is as follows:

Size	Thickness (In.)	Width (In.)
0	5	5
1	6	6
2	6	7
3	6	8
4	7	8
5	7	9
6	7	10

For heavy traffic areas in the plant, it is advisable to use sizes No 4, or No. 5; for light traffic areas, sizes No. 2 or No. 3 are adequate.

In purchasing ties, it is important to deal with reputable firms which follow standard specifications of the industry, choice of woods, quality, cutting, etc. It is easy to have inferior ties passed off as "just as good." The result will be tie failure and expensive maintenance costs. Ties take a continual pounding and beating and must be of high quality and sound structure to take the punishment over an extended period of time.

Before new ties are installed, they should be carefully inspected to see that there is no checking or incipient splitting and that the ties are up to specified dimensions. It is sometimes the practice to "shave" the width an inch below the specified figure, seriously reducing the necessary bearing surface.

For temporary service, it is economical to purchase used rather than new ties, although the used ties should be carefully inspected before they are approved.

To retard splitting and checking of ties, caused by exposure to extremes of weather, it is advisable to use anti-checking tie irons. These are "S" shaped iron strips, available in various lengths, that are driven into the end sections of the ties. Tie irons can greatly extend the life of wood ties and lower maintenance and replacement costs.

Fig. 2. Here is a good line of tie plates, fully-dimensioned, properly spiked. Although only one spike hole is used on each side of the rail, two are punched

Another worthwhile step for maintaining the structural integrity of the ties is the use of tie plugs. Available from suppliers, creosoted tie plugs come in standard dimensions and are inexpensive. They are driven into old spike holes to prevent decay as well as to provide good holding power for new spikes replacing old or damaged spikes. The plugs are of the softer woods because they fill the spike holes better, they absorb moisture, and swell and are less inclined to split the tie than hardwood plugs.

Probably the single most important reason for tie failure is mechanical damage and wear due to rail or plate cutting, spike killing, ballast abrasion and loose rail, rail joints and other connections. Tie damage can also occur from improper handling.

Ties should be moved only with tie tongs — instead of bars, chisels, forks, mauls, picks, shovels or sledges which make holes in the ties and permit the entrance of decay-causing moisture.

Ties located where locomotive ash pans are regularly emptied should be covered with metal sheets to protect them from being burned.

It is good practice to remove crushed fibers by adzing at points where the tie has been excessively damaged and to apply hot creosote to the new surface. This will prevent the entrance of moisture at the exposed area.

When a tie, due to excessive wear

Fig. 3. These tie plates do not have proper dimensions and therefore do not extend beyond rail to provide bearing surface making extensive stress possible

and mechanical damage, has deteriorated to the point where its structure is not sound enough to adequately anchor the track, it should be replaced.

Old ties can be removed and new ties installed with a tie-puller, a device which generally employs the jacking principle or a winch-type mechanism. The advantage of this tool over simpler hand tools is the fact that it requires little ballast digging; it lessens the disturbance of the ballast and roadbed and thereby eliminates later settlement of the tie. Cost of tie renewals is consequently reduced.

Tie spacers are used, as the name implies, to facilitate spacing of newly installed ties. They are of two general types: a simple lightweight attachment designed to fit all makes of track jacks; and an individual tool consisting of a rail clamp and a leverage arrangement with an extension handle.

Another tool used for tie installation is the tie nipper, which is designed to hold a tie tightly against the base of the rail during spiking and tamping operations. Depending upon the model, they are operated either manually or pneumatically.

Tie Plate Application

Tie plates were first used when introduction of the modern type thin-base steel rail caused the destruction of ties due to rail cutting, as well as difficulties due to rail tipping, especially on curves. Today, tie plates are looked upon as providing the following advantages:

1. Distribute the load from the rail to the tie, providing uniform bearing surface for the rail on the tie, as well as retaining a true bearing without movement of any kind.
2. Give the rail the proper cant, when required for curves and other traffic conditions.
3. Hold the rail rigidly to gage, by means of a bearing shoulder for one or both sides of the rail base.
4. Protect the ties against undue wear and damage.

Although there are many designs of tie plates on the market, for industrial use the single shoulder tie plate is satisfactory and economical. They should be of sufficient base thickness and area to distribute traffic loads adequately. In ordering tie plates, the following information should be supplied so that they can be accurately fabricated: Width of rail at base and rail section; number and location of spike holes; length and width.

Tie plates are made of steel not so soft that they will bend and not so hard that they will break. Width is limited to the width of the tie; the length should afford the required bearing area on the tie, together with a safe margin of metal between its edges and the holes punched for the track spikes.

Fig. 4. Because this tie was not properly tamped in place the tie plate cannot give full bearing under the rail. Note space between the tie plate and the rail

Substantial economies can be obtained by purchasing used rather than new tie plates.

When tie plates are installed care should be taken to make sure that the plates have a full even bearing on the tie and that the shoulder of the plate rests against the base of the rail along the full width. The shoulder of the plate should not be permitted to remain under the base of the rail. To provide a level bearing, the tie area where the plate is to be placed should be adzed flat.

It is sometimes desirable to use track pads as a means of reducing tie damage caused by tie plates. They are proprietary products designed for insertion between the tie and tie plate and act to reduce plate cutting and mechanical wear of the ties, as well as to provide a cushion for the absorption of impact and to deaden noise.

To protect tie plates and other components of the track structure from the corrosive effects of brine drippings from refrigerator cars, sea water, etc. continued applications of hot oil of a high asphaltic content can be used with satisfactory results.

There are four classes of track spikes and similar rail fastenings in use: (a) compression spring-type fastenings, (b) compression spring clips and bolts, (c) cut spikes and (d) screw spikes. The compression spring-type spike is essentially one-piece, but is made with two back-to-back leaves of high-carbon or spring steel.

Compression spring-type fastenings consist of a spring steel clip provided with a projection which fits into the tie plate punching, and a hook bolt which fastens the spring to the tie plate. While the spring type fastenings can be used to hold down the tie plates independent of the rail, they are essentially rail-hold fastenings. They are designed to provide increased holding power over conventional types.

Cut spikes are the most commonly used type of fastening for holding rails directly to ties. Together with screw spikes they are also used for securing the tie plates to the ties independently of the rails.

Four holes for rail-holding spikes, two along each side of the rail seat, are usually provided in the tie plates. Good spiking practice requires that rail spikes be staggered on the gage and field sides of the rail.

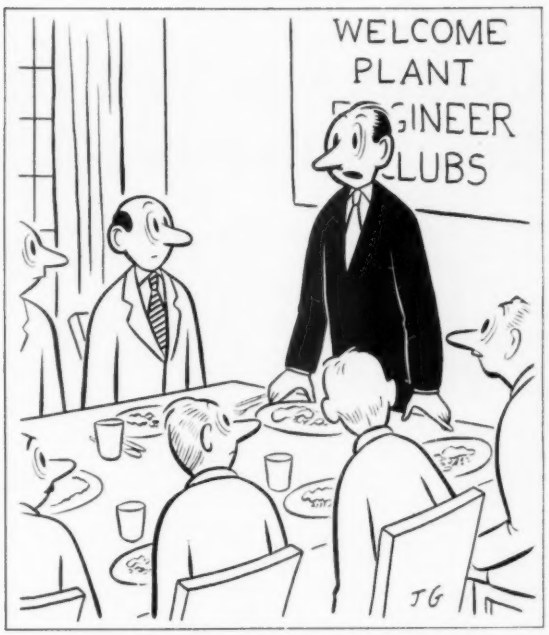
Although one rail spike hole may be used on each side of the rail, two are punched as noted above so as to (1) permit use of additional spikes on curves or other locations where lateral rail thrust tends to widen gage, and (2) avoid the necessity of having right and left hand plates for complying with standard spiking practice.

As in the case of any type of assembly, the trackage structure is only as good as its fastenings. Therefore regular inspection of tie plate and rail fastenings are of the utmost importance. Spikes that loosen should be immediately re-driven; corroded, damaged or broken spikes should be promptly replaced. Spikes are pulled with a hand tool known, not surprisingly, as a spike puller, and spikes are driven with a railroad spike maul.

In the next article in this series, rails, rail anchors and rail joint bars will be discussed.

News Roundup — Plant Engineers' Societies

Plant Engineers' Societies begin another year of activities . . . Marion and Chicago groups plan tours . . . San Francisco, Baltimore, Union-Middlesex appoint new officers . . . Northern New Jersey has guest speaker for meeting



"Gentlemen, I have two very important words to say — 'Let's Eat!'"

AS THE NUMBER of Plant Engineers' Societies increase so will their activities. Following is a brief report of what some of these Societies are doing:

Marion, Indiana

First meeting of the fall season for the Marion Engineers' Club was held at the plant of Owens-Illinois Glass Co., Gas City, Indiana. Fifty members and guests attended dinner at the Onized Club House and later toured the glass container and corrugated box operations of Owens-Illinois. Representing the plant manager, Mr. S. M. Cantrill, as host was Mr. Ray Garland, formerly plant engineer for Owens-Illinois. Program chairman for the evening was John Minns, Owens-Illinois industrial engineer.

Club President, Bob Goldthwaite, conducted the business of the meeting and general chairman E. Stuart Savage announced the schedule of events for the coming meetings. The Club is planning an industrial fire safety discussion which will be followed by meetings covering quality control, lubrication, color television, materials handling and hydraulics.

Baltimore

New officers elected to take over the duties of the Plant Engineers' Society of Baltimore for the coming year, are: Paul Bobick, Continental Can Co., who will serve as president; John H. Wolfe, Jr., Black & Decker Mfg. Co., the new vice president; and Harry K. Wells, McCormick & Co., Inc., who will take on the duties of secretary-treasurer.

Members of the Marion Engineers Club, touring the Owens-Illinois Glass Company plant at Gas City, watch the frosted finish being applied to a bottle

Chicago

Members of the Plant Engineers' Society of Chicago toured the plant of the Interstate Bakeries Corp., 40 East Garfield Blvd., Chicago, for their October meeting.

Fred L. Leason, Jr., plant engineer, and a member of the Chicago Plant Engineers' Society, served as guide for the tour.

Union-Middlesex Counties, N. J.

New officers for the Plant Engineers' Association of Union-Middlesex Counties, New Jersey, will be: Richard Austin, American Cyanamid Co., Warners Plant, Linden, New Jersey, for president, and N. S. Woodruff, Hercules Powder Co., Parlin, New Jersey, the new secretary.

San Francisco

Bernard C. Flett, Bethlehem Pacific Coast Steel Corp., will take over the duties of president for the Plant Engineers' Society of San Francisco for the coming year. He will be assisted by Lou J. Ghilardi, Hall-Scott Motor Div., as vice president; Henry D. Wood, Marchant Calculators, as secretary; and Frank H. Reeve, General Metals Corp., Enterprise Div., as treasurer.

Member-at-large will be Robert

(Continued on page 188)

Guideposts Tell How to Select Dust Collecting Equipment

Many factors should be considered before selecting the dust collector to serve your needs . . . To be sure that you choose the proper equipment to handle your dust problem, check this list of items before making final decision

By **JOHN M. KANE**, Manager, Dust Control Products, American Air Filter Co., Inc., Louisville, Ky.

PLANT ENGINEERS will find the following observations of assistance when considering the selection of dust collecting equipment.

A given dust collection problem should be evaluated either: (a) On the basis of known and recognized collector design for the particular problem, or (b) An evaluation of the dust characteristics; the carrier gas stream characteristics; and requirement of the dust control device.

In the latter case, the following comments will serve as a check list of information required and decisions to be made for a solution to a specific application.

Mean dust particle size and range: If the dust particles are coarse and the range of sizes limited, it is easy to remove these particles with less expensive control equipment. However, if all particles were of a stated size, collection would be higher with any dust collector than if there were a considerable quantity of smaller and larger particle sizes.

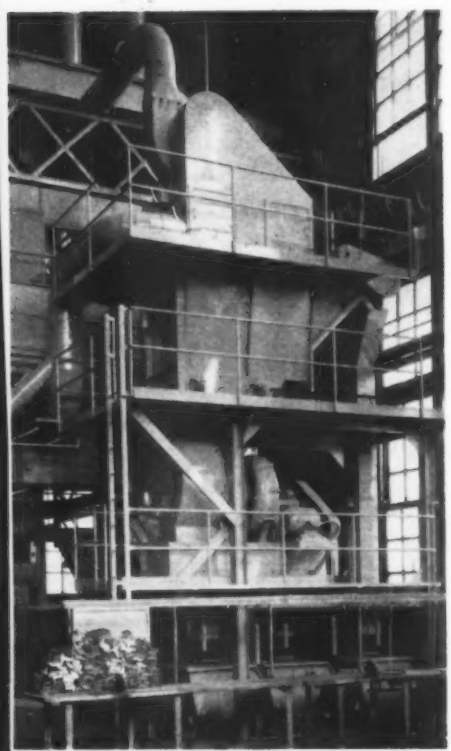


Fig. 1. This installation "stacks" one collector above the other, saving space

Concentration: The heavier the dust loadings, the higher the collector efficiency required to reduce the quantities discharged to the atmosphere to a reasonable degree. For a given exhaust volume, a collector with 50 per cent collection efficiency on a loading of one grain per cubic foot will discharge with the cleaned air the same number of pounds as a device with 90 per cent collection efficiency with a loading of five grains.

Range of Particle Sizes

Such illustrations, however, have one major flaw too frequently overlooked in that the particles escaping the collector with 50 per cent control would be much larger and would settle more quickly in the immediate area than in the case of the more efficient collector operating on the same or the higher loading. This comment is the only drawback to the frequently heard advice of "evaluate the amount of material escaping the dust collector instead of the percentage caught."

The range of mean particle sizes and concentrations shown in Fig. 2 will help for the operations listed and will give a background for probable conditions of similar problems in fields where data has not been so extensively observed and checked.

Where air or gas density differs from standard air (70 F and 29.92 in.), reduction to these standard conditions will help in the evaluation.

Abrasive characteristics: There is nothing more exasperating to a purchaser and more embarrassing to a supplier than the wearing through of a dust collector in a few months of service. Two general errors in evaluation account for many such failures:

(a) Failure to evaluate concentration, particle size, and particle shape. Of the three, particle size is the most frequently overlooked. Abrasion on collector surfaces per pound of material collected is a function of surface area of the particles. As surface area varies roughly as the cube, it is apparent that the surface area of a given weight of one micron particle will have roughly 1000 times the surface of a similar weight of 10 micron particles. The same 1000 factor applies between 10 microns and 100 microns. It is particle size more than concentration that explains the greatly increased abrasion from pulverized fuel fly ash as compared to fly ash from spreader stoker fired boilers; from rock crushers compared to metallic grinding with an abrasive wheel.

(b) Where abrasion is anticipated, reduction in trouble is often attempted by trapping out a large portion of the dust load before reaching the exhauster or collector. Removal of 85 per cent of the dust load by such a primary device seldom more than doubles the equipment life on the downstream side. The reason has been explored in item (a)—the coarse particles with small surface area per pound are eliminated, but the fines with their extensive surface area still remain to rub against the metallic surfaces under discussion.

Evaluate abrasion possibilities whenever any organic dusts are involved. Grain hulls, tobacco leaf and stems cause surprising amounts of abrasion.

On the other hand, many a reported case of collector deterioration from premature wear is caused by poor collector design, installation, or operation. Under such cases, dust loadings may recycle within the collector causing wear the equivalent of many times the entering concentration.

Adhesive characteristics: Some collectors are more critical than others to plugging caused by sticking, packing, or hygroscopic characteristics of the materials. Collectors with small air

passages, and collectors in the fabric group would be most susceptible to such problems. Dry centrifugals with small dust discharge ports will plug in outdoor locations during start up of dryers on cool mornings; fabric arresters are questionable on foundry shakeout and sand conditioning systems due to moisture vapor load picked up by the exhaust air from the hot, moist sand.

In marginal instances, added costs of insulation or added source of heat may be necessary.

Bridging characteristics: In many industrial dust control problems, bridging can cause plugging of collector passages and dust disposal devices. Physical dimensions of wood chips from woodworking can be greater than the passages provided for their removal or disposal: "onion skin" wood shavings and linty dusts can bridge between collector surfaces, dusts of low specific gravity or of wide range in particle size (providing high degree of voids and low bulk weight) can bridge over dust bin discharge openings. Bin vibrators will prevent bridging trouble in hoppers as long as no storage occurs in dust hopper. With many materials, bridging is accelerated by vibrators due to the packing action on partially full hoppers.

Precautions Against Fire

Fire or explosion hazard: Evaluation of safeguards is recommended where dust is from organic materials such as spices, grain, wood flour, cotton lint, chemicals and sulphur, those used in the manufacture of plastics, magnesium, aluminum and coal. The smaller the particle size, the greater the rate of flame propagation. Fortunately, concentrations in exhaust systems are usually below minimum explosive concentrations and source of ignition improbable. The hazard is greatest where mechanical attrition occurs in the process or where dust loadings are very high as in pneumatic conveying systems.

The biggest hazard from fire or explosion in dry type dust collectors is the welding rod or cutting torch used by maintenance and repair personnel.

Foreign material: Certain types of industries appear unable to keep workmen from disposing of cleaning rags, lunch wrappers, cigarette packaging via the exhaust hoods provided for their comfort and protection. Such foreign material can play havoc with many types of dust collectors and dust disposal devices. Quantities are too great in most cases to make screening out of such material possible without danger of the screen plugging, with consequent extreme reduction in exhaust volume.

Corrosive gases: Corrosive gases are

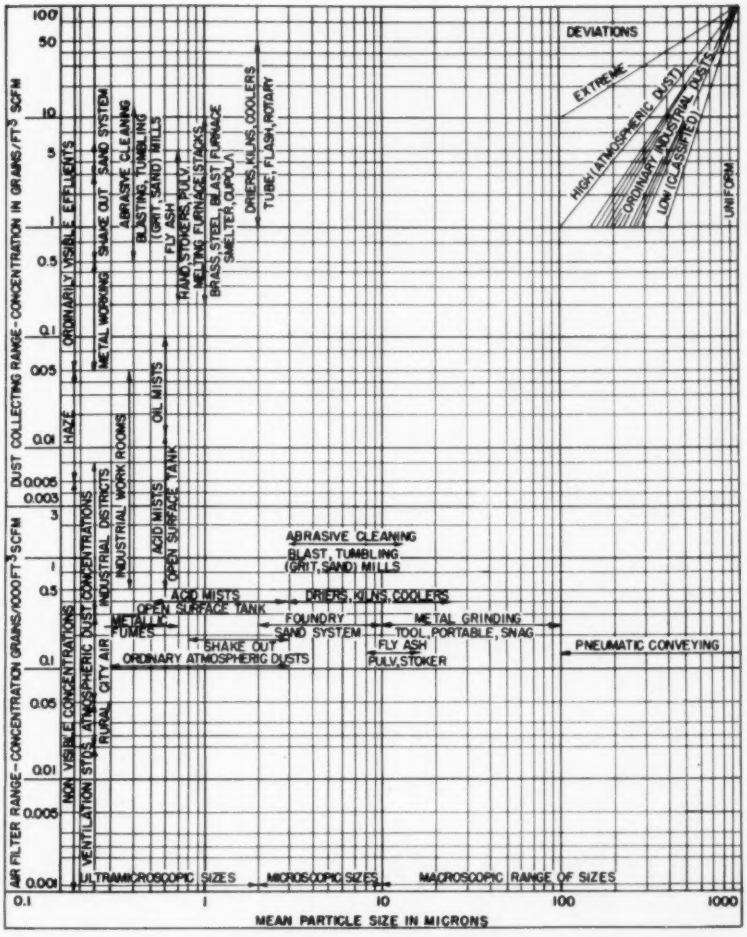


Fig. 2. Range of mean particle size and concentrations for operations mentioned in Table II will serve as a guide for probable conditions of similar operations

especially significant in wet collector designs and may necessitate expensive special materials of construction. Where gases of combustion are handled by wet collectors, corrosion possibilities should be carefully evaluated. Neutralizing the supply of water is expensive and seldom a complete answer. Only a portion of such gases are scrubbed out by the water in the dust collector passages and corrosion is often the greatest problem on the damp surfaces of cleaned gas passages, exhauster, and discharge stack.

In less frequent cases, dry gases can cause attack on fabrics in collectors, or set up electrolytic attack on metallic parts.

Volume: The total cubic feet per minute of gas to be cleaned will influence collector selection in several respects.

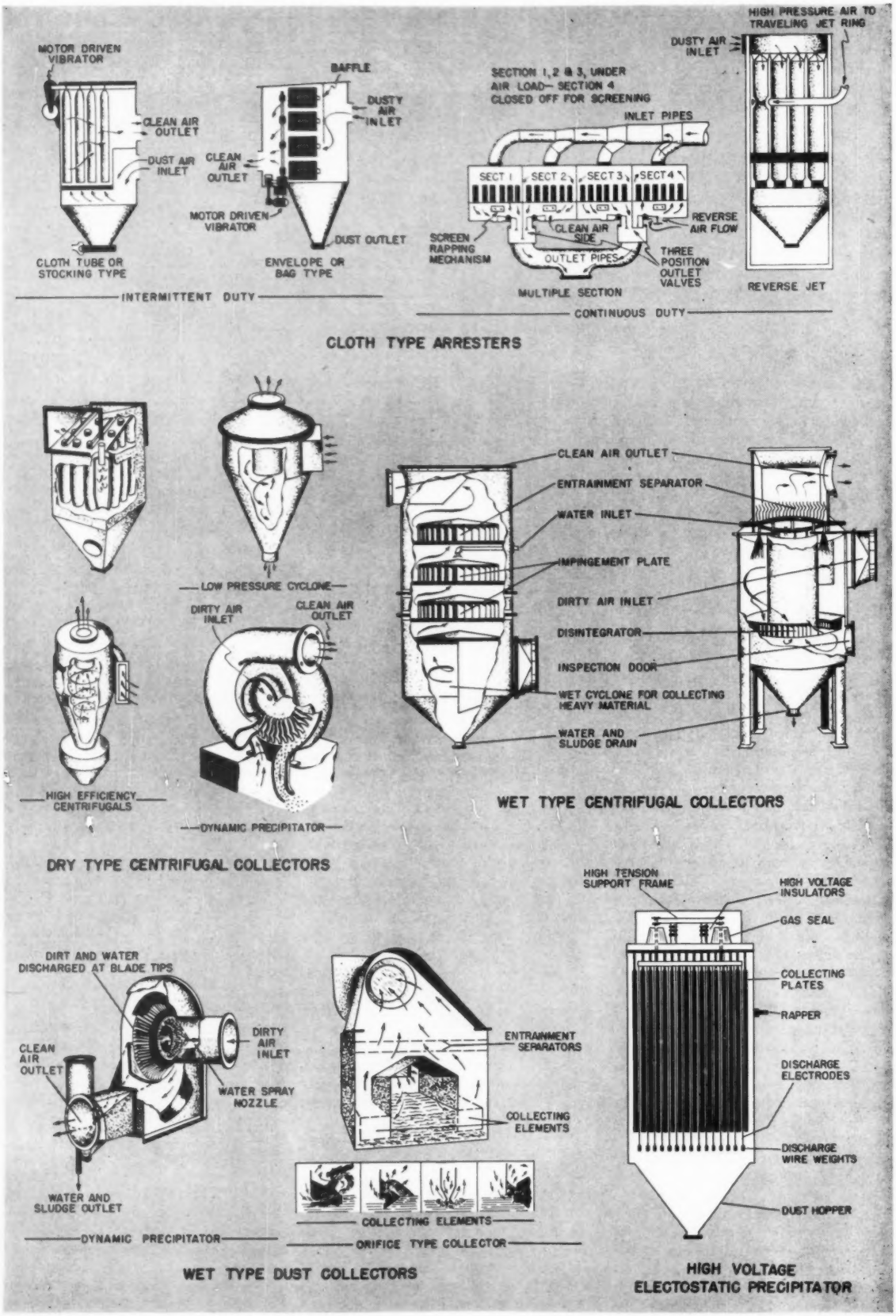
1. Unit collectors could have application for small systems involving up to a few thousand cubic feet per minute. They would seldom be used where large volumes are handled as the equipment cost, floor space, number of servicing and dust disposal points would point in favor to one or more central systems.

2. Very large volumes from numerous dust producing points will often be broken into several smaller systems to provide greater flexibility and more readily accommodate exhaust system and dust collector relocation with changes in plant processes or layout.

3. Some dust collector efficiencies decrease with size which could rule out selection for large volumes.

For example, a cyclone designed for 50,000 cfm may have a lower efficiency than a geometrically similar cyclone design dimensioned for 5,000 cfm.

4. Cost can rule out some designs except under extreme circumstances. It will be rare that high voltage electrostatic will be used for volumes under 25,000 to 50,000 cfm. Cost of accessory electrical equipment makes cost per unit of volume very high where smaller volumes are involved. For volumes under 1,500 to 2,500 cfm,


MOTOR DRIVEN VIBRATOR
CLEAN AIR OUTLET
DUST AIR INLET
CLOTH TUBE OR STOCKING TYPE
BAFFLE
DUSTY AIR INLET
CLEAN AIR OUTLET
MOTOR DRIVEN VIBRATOR
DUST OUTLET
ENVELOPE OR BAG TYPE
INTERMITTENT DUTY
HIGH PRESSURE AIR TO TRAVELING JET RING
DUSTY AIR INLET
SECTION 1, 2 & 3, UNDER AIR LOAD— SECTION 4 CLOSED OFF FOR SCREENING
INLET PIPES
SECT 1
SECT 2
SECT 3
SECT 4
REVERSE AIR FLOW
CLEAN AIR SIDE
SCREEN RAPPING MECHANISM
OUTLET PIPES
THREE POSITION OUTLET VALVES
MULTIPLE SECTION
REVERSE JET
CONTINUOUS DUTY
CLOTH TYPE ARRESTERS
LOW PRESSURE CYCLONE
HIGH EFFICIENCY CENTRIFUGALS
DIRTY AIR INLET
CLEAN AIR OUTLET
DYNAMIC PRECIPITATOR
DRY TYPE CENTRIFUGAL COLLECTORS
CLEAN AIR OUTLET
ENTRAINMENT SEPARATOR
WATER INLET
IMPINGEMENT PLATE
DIRTY AIR INLET
DISINTEGRATOR
INSPECTION DOOR
WET CYCLONE FOR COLLECTING HEAVY MATERIAL
WATER AND SLUDGE DRAIN
WET TYPE CENTRIFUGAL COLLECTORS
DIRT AND WATER DISCHARGED AT BLADE TIPS
CLEAN AIR OUTLET
DIRTY AIR INLET
WATER SPRAY NOZZLE
WATER AND SLUDGE OUTLET
DYNAMIC PRECIPITATOR
ENTRAINMENT SEPARATORS
COLLECTING ELEMENTS
COLLECTING ELEMENTS
ORIFICE TYPE COLLECTOR
WET TYPE DUST COLLECTORS
HIGH TENSION SUPPORT FRAME
HIGH VOLTAGE INSULATORS
GAS SEAL
COLLECTING PLATES
RAPPER
DISCHARGE ELECTRODES
DISCHARGE WIRE WEIGHTS
DUST HOPPER
HIGH VOLTAGE ELECTOSTATIC PRECIPITATOR

installed cost of wet collectors is high with the need for water supply and drain connections.

Gas temperature: Many collectors have temperature limitations beyond which they can be used only with special materials or expensive accessory equipment. Standard fabric arresters are not recommended with cotton filter media for more than 170 or 180 F; with wool not over 200 F. Even with expensive synthetic fabrics 275 F is the usual upper limit without elaborate gas cooling auxiliary equipment.

Dry type mechanical collectors of standard steel construction are usually limited to 750 F although stationary designs especially with cast metal parts are often found in service up to 900 F.

Condensable vapors: Presence of mists, steam, high water vapor content or other condensable vapors can make many collectors inoperative by "mudding" moist dust deposits on collector surfaces, restricting air flow.

An outline of dust collector characteristics has been compiled in Table I. It shows the usual relationships between the basic groups of collector designs.

Evaluation of the collector should include consideration of the factors discussed below.

Collection efficiency required: Minimum acceptable performance will depend on plant location, dust concentration, particle size range, local meteorological problems, community or state regulations and the point of cleaned gas discharge. The larger the exhaust volume, the higher the efficiency usually required with the accompanying increased "mass rate of emission." Even in isolated areas, the parking lot for employees' automobiles can be a source of grievance and complaint from material settling on cars.

Fig. 3. Many times dust collectors must be located outdoors. This installation shows how platforms facilitate the inspection and servicing of this equipment

For most applications, collection efficiency stated as a percentage removal by weight of the entering contaminant will be a sufficient gage of performance. Where particle size cannot be defined or measured, collection efficiency can be expressed by degree of removal in certain size fractions usually plus 325 mesh, 20-44 microns, 10-20 microns, 5-10 microns; sometimes 1 to 5 microns and less than 1 micron. (Checking of fractional size involves tedious, expensive analysis of samples and answers will vary with the technique used.) Where cleaned air is recirculated to occupied space, air cleanliness in number of particles by count per cubic foot of air is the most significant. Where air pollution control (as opposed to "public nuisance" elimination from settled coarser materials) requires high degree of sub micron removal, visible standards (usually expressed vaguely in degrees of opacity) may be necessary although there is no known correlation between visible appearance and a concrete measurement in terms by weight.

An excellent guide is the selection of equipment with the highest order of contaminant removal available at a reasonable installed, operating and maintenance cost.

Types available: A review of the problem against the dust and gas stream characteristics and a decision on degree of cleaning required will eliminate certain types of equipment from consideration and permit more careful evaluation of the remaining possibilities. Table II may be of assistance in selecting the proper collector.

In Table II, an effort has been made

Table I. Shown here are the operating efficiency characteristics of the various types of dust collecting equipment

	Cyclones	High Efficiency Centrifugals	Wet Collectors	Fabric Arresters	High Voltage ElectroStatic
THE EFFECT OF DUST VARIATIONS					
Efficiency, particles less than 1 micron	poor	poor	poor to fair	good	good
Efficiency, " 1—10 microns	poor	poor to fair	fair to good	good	good
Efficiency, " 10—20 microns	poor	good	good	good	good
Efficiency, " Over 20 microns	fair to good	good	good	good	good
Abrasion resistance	fair	fair	good	good	fair
Handles sticky, adhesive materials	fair	poor	poor to good	poor	poor
Bridging material gives troubles	slight	yes	no	yes	yes
Fire or explosion hazard minimized	fair	fair	good	poor	poor
Can handle hygroscopic materials	yes	fair	yes	with care	with care
Large foreign materials cause plugging	seldom	yes	seldom to yes	seldom	yes
THE EFFECT OF GAS STREAM VARIATION					
Maximum temperature standard construction	750 F	750 F	no limit	180-275 F	750 F
Troubles from condensed or entrained mists or vapors	slight	considerable	slight	considerable	some
Corrosive cases attach standard construction	slight	slight	severe	slight	slight
THE COLLECTOR					
Space	large	modest	modest	modest to large	large
Pressure drop	1-2 in.	3-5 in.	3-6 in.	2-6 in.	1-2 in.
Reduced volume adversely affects collection efficiency	yes	yes with most designs	depends on design	no	no

Table II. Following table covers a wide range of industrial processes and dust collector used for each classification

Operation	Concentration	Particle Sizes	COLLECTOR TYPES USED IN INDUSTRY Cyclone	High Eff. Centrifugal	Wet Collector	Fabric Arrester	Hi-Volt. Electrostatic	See Remark No.
CERAMICS								
a. Raw product handling	light	fine	rare	seldom	frequent	frequent	no	1
b. Fettling	light	fine to medium	rare	occasional	frequent	frequent	no	2
c. Refractory sizing	heavy	coarse	seldom	occasional	frequent	frequent	no	3
d. Glaze & vitr. enamel spray	moderate	medium	no	no	usual	occasional	no	
CHEMICALS								
a. Material handling	light to moderate	fine to medium	occasional	frequent	frequent	frequent	rare	4
b. Crushing, grinding	moderate to heavy	fine to coarse	often	frequent	frequent	frequent	no	5
c. Pneumatic conveying	very heavy	fine to coarse	usual	occasional	rare	usual	no	6
d. Roasters, kilns, coolers	heavy	med-coarse	occasional	usual	usual	rare	often	7
COAL MINING AND POWER PLANT								
a. Material handling	moderate	medium	rare	occasional	frequent	frequent	no	8
b. Bunker ventilation	moderate	fine	occasional	frequent	occasional	frequent	no	9
c. Dedusting, air cleaning	heavy	med-coarse	frequent	frequent	occasional	often	no	10
d. Drying	moderate	fine	rare	occasional	frequent	no	no	11
FLY ASH								
a. Coal burning—chain grate	light	fine	no	rare	no	no	no	12
b. Coal burning—stoker fired	moderate	fine to coarse	rare	usual	no	no	rare	
c. Coal burning—pulverized fuel	heavy	fine	rare	frequent	no	no	frequent	13
d. Wood burning	varies	coarse	occasional	occasional	no	no	no	14
FOUNDRY								
a. Shakeout	light to moderate	fine	rare	rare	usual	rare	no	15
b. Sand handling	moderate	fine to medium	rare	rare	usual	rare	no	16
c. Tumbling mills	heavy	med-coarse	no	no	frequent	frequent	no	17
d. Abrasive cleaning	moderate to heavy	fine to medium	no	occasional	frequent	frequent	no	18
GRAIN ELEVATOR, FLOUR AND FEED MILLS								
a. Grain handling	light	medium	usual	occasional	rare	frequent	no	19
b. Grain dryers	light	coarse	no	no	no	no	no	20
c. Flour dust	moderate	medium	usual	often	occasional	frequent	no	21
d. Feed mill	moderate	medium	usual	often	occasional	frequent	no	22
METAL MELTING								
a. Steel blast furnace	heavy	varied	frequent	rare	frequent	no	frequent	23
b. Steel open hearth	moderate	fine to coarse	no	no	doubtful	possible	probable	24
c. Steel electric furnace	light	fine	no	no	considerable	frequent	rare	25
d. Ferrous cupola	moderate	varied	rare	rare	frequent	occasional	occasional	26
e. Non-ferrous reverberatory	varied	fine	no	no	rare	?	?	27
f. Non-ferrous crucible	light	fine	no	no	rare	occasional	?	28
METAL MINING AND ROCK PRODUCTS								
a. Material handling	moderate	fine to medium	rare	occasional	usual	considerable	?	29
b. Dryers, kilns	moderate	med-coarse	frequent	frequent	frequent	rare	occasional	30
c. Cement rock dryer	moderate	fine to medium	rare	frequent	occasional	no	occasional	31
d. Cement kiln	heavy	fine to medium	rare	frequent	rare	no	considerable	32
e. Cement grinding	moderate	fine	rare	rare	no	frequent	rare	33
f. Cement clinker cooler	moderate	coarse	occasional	occasional	?	?	?	34
METAL WORKING								
a. Production grinding, scratch brushing, abrasive cut off	light	coarse	frequent	frequent	considerable	considerable	no	35
b. Portable and swing frame	light	medium	rare	frequent	frequent	considerable	no	
c. Buffing	light	varied	frequent	rare	frequent	rare	no	36
d. Tool room	light	fine	frequent	frequent	frequent	frequent	no	37
e. Cast iron machining	moderate	varied	rare	frequent	considerable	considerable	no	38
PHARMACEUTICAL AND FOOD PRODUCTS								
a. Mixers, grinders, weighing, blending, bagging, packaging	light	medium	rare	frequent	frequent	frequent	?	39
b. Coating pans	varied	fine to medium	rare	rare	frequent	frequent	no	40
PLASTICS								
a. Raw material processing	(See comments under Chemicals)							41
b. Plastic finishing	light to moderate	varied	frequent	frequent	frequent	frequent	no	42
RUBBER PRODUCTS								
a. Mixers	moderate	fine	no	no	frequent	usual	no	43
b. Batchout rolls	light	fine	no	no	usual	frequent	no	44
c. Talc dusting and dedusting	moderate	medium	no	no	frequent	usual	no	45
d. Grinding	moderate	coarse	often	often	frequent	often	no	46
WOODWORKING								
a. Woodworking machines	moderate	varied	usual	occasional	rare	frequent	no	47
b. Sanding	moderate	fine	frequent	occasional	occasional	frequent	no	48
c. Waste conveying, hogs	heavy	varied	usual	rare	occasional	occasional	no	49

REMARKS REFERRED TO IN TABLE II ON PREVIOUS PAGE

1. Dust released from bin filling, conveying, weighing, mixing, pressing, forming. Refractory products, dry pan and screening operations more severe.
2. Operations found in vitreous enameling, wall and floor tile, pottery.
3. Grinding wheel or abrasive cut off operation. Dust abrasive.
4. Operations include conveying, elevating, mixing, screening, weighing, packaging. Category covers so many different materials that recommendation will vary widely.
5. Cyclone and high efficiency centrifugals often act as primary collectors followed by fabric or wet type.
6. Usual set up uses cyclone as product collector followed by fabric arrester for high overall collection efficiency.
7. Dust concentration determines need for dry centrifugal; plant location, product value determines need for final collectors. High temperatures are usual and corrosive gases not unusual.
8. Conveying, screening, crushing, unloading.
9. Remote from other dust producing points. Separate collector usually.
10. Heavy loading suggests final high efficiency collector for all except very remote locations.
11. Difficult problem but collectors will be used more frequently with air pollution emphasis.
12. Public nuisance from boiler blow-down indicates collectors are needed.
13. Higher efficiency of electrostatic indicated for large installations especially in residential locations. Often used in conjunction with dry centrifugal.
14. Public nuisance from settled wood char indicates collectors are needed.
15. Hot gases and steam usually involved.
16. Steam from hot sand, adhesive clay bond involved.
17. Concentration very heavy at start of cycle.
18. Heaviest load from airless blasting due to higher cleaning speed. Abrasive shattering greater with sand than with grit or shot. Amounts removed greater with sand castings, less with forging scale removal, least when welding scale is removed.
19. Operations such as car unloading, conveying, weighing, storing.
20. Collection equipment expensive but public nuisance complaints becoming more frequent.
21. In addition to grain handling, cleaning rolls, sifters, purifiers, conveyors, as well as storing, packaging operations are involved.
22. In addition to grain handling, bins, hammer mills, mixers, feeders, conveyors, bagging operations need control.
23. Primary dry trap and wet scrubbing usual. Electrostatic is added where maximum cleaning required.
24. Cleaning equipment seldom installed in past. Air pollution emphasis indicates collector use will be more frequent in future.
25. Where visible plume objectionable from air pollution standards, use of fabric arresters with greater frequency seems probable.
26. Most cupolas still have no collectors but air pollution and public nuisance emphasis is creating greater interest in control equipment.
27. Zinc oxide loading heavy during zinc additions. Stack temperatures high.
28. Zinc oxide plume can be troublesome in certain plant locations.
29. Crushing, screening, conveying, storing involved. Wet ores often introduce water vapor in exhaust air stream.
30. Dry centrifugals used as primary collectors, followed by final cleaner.
31. Collection equipment installed primarily to prevent public nuisance.
32. Collectors usually permit salvage of material and also reduce nuisance from settled dust in plant area.
33. Salvage value of collected material high. Same equipment used on raw grinding before calcining.
34. Coarse abrasive particles readily removed in primary collector types.
35. Roof discoloration, deposition on autos can occur with cyclones and less frequently with dry centrifugal. Heavy duty air filters sometimes used as final cleaners.
36. Linty particles and sticky buffing compounds can cause trouble in high efficiency centrifugals and fabric arresters. Fire hazard is also often present.
37. Unit collectors extensively used, especially for isolated machine tools.
38. Dust ranges from chips to fine floats including graphitic carbon.
39. Materials involved vary widely. Collector selection may depend on salvage value, toxicity, sanitation yardsticks.
40. Controlled temperature and humidity of supply air to coating pans makes recirculation from coating pans desirable.
41. Manufacture of plastic compounds involve operations allied to many in chemical field and vary with the basic process employed.
42. Operations are similar to woodworking and collector selection involves similar considerations. See Item 13.
43. Concentration is heavy during feed operation. Carbon black and other fine additions make collection and dust free disposal difficult.
44. Often no collection equipment is used where dispersion from exhaust stack is good and stack location favorable.
45. Salvage of collected material often dictates type of high efficiency collector.
46. Fire hazard from some operations must be considered.
47. Bulky material. Storage for collected material is considerable, bridging from splinters and chips can be a problem.
48. Production sanding produces heavy concentration of particles too fine to be effectively caught by cyclones or dry centrifugals.
49. Primary collector invariably indicated with concentration and partial size range involved, wet or fabric collectors when used are employed as final collectors.

to report types of dust collectors encountered for a wide range of industrial processes. While many of the ratings are purely arbitrary and are a matter of personal opinion, they may serve as a check list.

Indoor or outdoor collector location: Space required and space available will determine collector location. Outdoor locations suffer greatly from neglect and may require protection against freezing or condensation. During cold or rainy weather and during night time operation, there are few workmen who will follow prescribed schedules of inspection, servicing, preventive maintenance where collector is in an exposed outdoor location.

Installation work required: Amount and cost of installation work is an extreme variable depending on design. Such costs can outweigh and make unattractive a product whose f.o.b. price might be substantially below that of other designs.

Provisions for material salvage or disposal: Decisions on disposal of collected material must be a part of initial collector discussions as collector location, use of wet or dry devices, storage capacities, selection of material handling equipment will be important factors in type and arrangement of collector best suited for a particular problem.

Provisions for maintenance: Any dust collector will require some attention. Generally, the higher the order of cleaning, the more routine inspection and servicing is required. Be certain that access platforms and permanent ladders are provided to encourage the attention needed and provide maximum safety for the personnel involved.

It is good practice to study collector installation, operation, and maintenance instructions before purchase of a collector design rather than after the collector is delivered.

Need for makeup air supply: If total volume exhausted from room or building exceeds two air changes per hour, give serious consideration to makeup air supply. Heating costs will be less, cold drafts reduced and exhaust systems will function as planned. Well located makeup air discharges can increase exhaust system effectiveness in providing controlled air flow toward all dust producing areas.

Installation, operating and maintenance costs: No comparative evaluation of collectors is complete without an appraisal of these items. Collector purchase price is often a small portion of total cost. Consider and include erection, supervision, foundations, wiring, plumbing, disposal equipment and accessory equipment not included with the collector proposal before final selection of collector type or design.

CRANE HOOKS — Check-Points for Safe Operation

Crane hooks play an important part in handling materials in plants each day . . . That is why they should be inspected periodically . . . Author tells what to check and lists points to watch to insure safe operation of equipment

By W. H. PAUL, Plant Manager, American Chain Division, American Chain and Cable Co., Braddock, Pa.

SINCE CRANE MANUFACTURERS equip their cranes with well designed hooks, there have been very few cases of crane hook failure. However, the best of equipment should be given periodic inspection to insure continued safe operation.

Most important, of course, is to avoid making lifts where the load is off the center line of the hook, see Fig. 1. Obviously, unless the hook was specifically designed for this type of loading, its safe load would be considerably reduced with this manner of loading. This condition is most generally found where the head room is low and it is necessary to use two double slings. It is more desirable to use a four-way sling, similar to either Figs. 2 or 3.

The most simple way to check crane hooks for overload is to center punch two marks, as shown in Fig. 4, and note the distance on a record card. The throat opening of the hook should be also measured and noted.

The distance between the center punch marks can be periodically checked and if the hook has been overloaded, the distance between the marks will, of course, have increased. In general, we would recommend that the hook be replaced if the throat opening has been increased by 5 per cent or more.

Frequency of inspection would, of course, depend on the severity of use. Monthly inspection usually suffices.

It would also be desirable to inspect the hook for wear at the bottom of the bowl. Wear at this point is caused by cable or chain master links. If the wear is slight, the sharp edges may be removed with a portable grinder, taking care not to reduce the section any more than absolutely necessary. Do not attempt to weld the hook at this point—or any point—unless the hook is removed and normalized after welding.

At least once a year the hook should be removed from the crane. At this time the shank should be inspected for wear and, if possible, the hook should be given a magnetic flux inspection. The vertical alignment of the hook should also be checked at this time.

When it is necessary to replace crane hooks, use of the following or similar materials are recommended, A.I.S.I. — 1025 steel, A.I.S.I. — 8620 steel. The carbon content of the straight carbon steels should not exceed 0.30 per cent. The carbon content on alloy steels should not exceed 0.25 per cent.

After forging, all hammer marks and wrinkles should be removed before heat-treatment so that the surface is reasonably smooth.

It is also recommended after forging, that the hook be normalized at 1600/1650 F and then be drawn at a minimum of 1000 F. This latter operation is extremely important since it is always possible, in most any shop, that while the hook is being cooled, in some manner steam or water or some other liquid may come in contact with the hook, setting-up a critical stress that may cause failure. Drawing the hook at temperature of 1000 F minimum assures elimination of this possibility.

When quenching facilities are available, it is more desirable to quench and draw these hooks to a Brinell hardness of 160/200 for carbon steels and 240/300 Brinell for alloy steels.

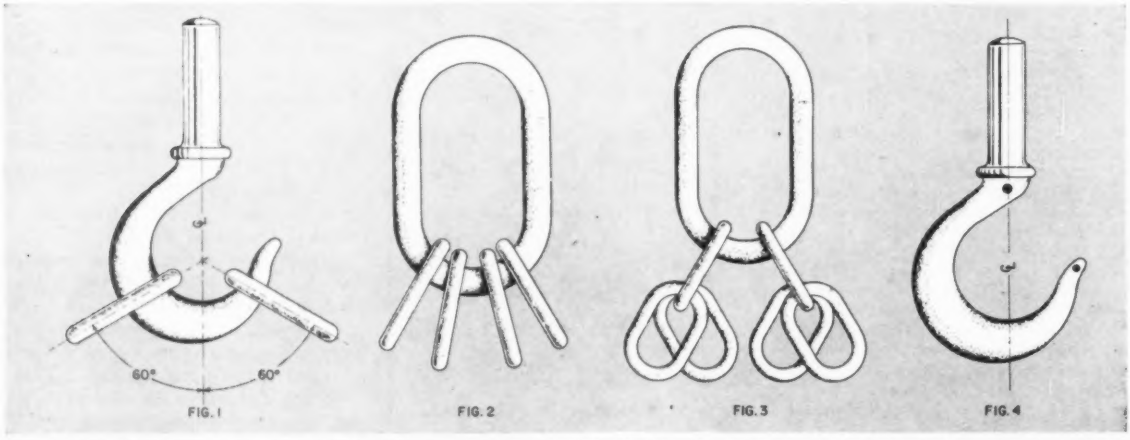


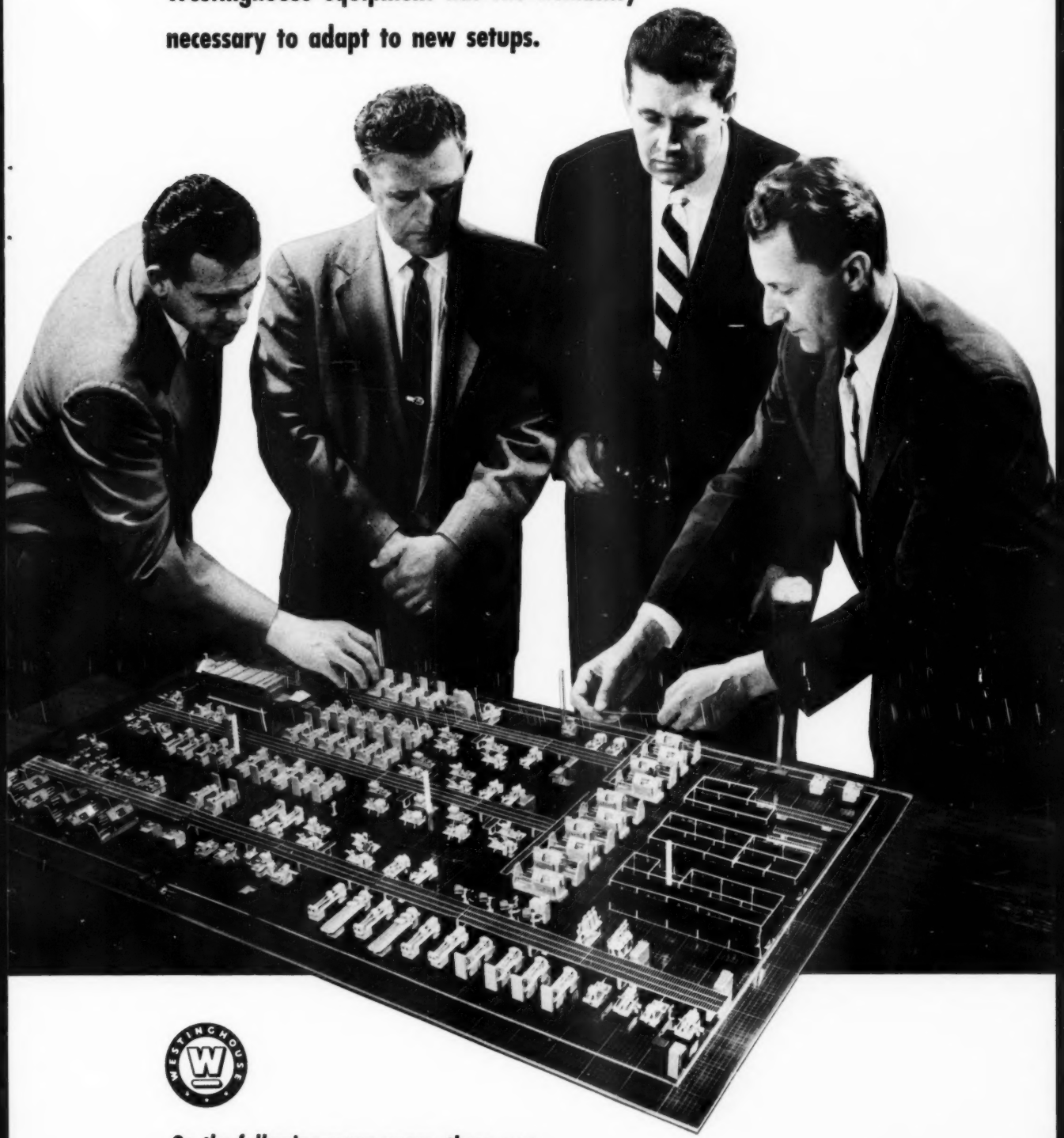
Fig. 1. Here's what not to do. Avoid making lifts where the load is off the center line of the hook. Figs. 2 and 3 show how this should be handled by use of a four-way sling.

Fig. 4. How to check for overload. Center punch two marks as shown and note distance on record card. If throat opening is increased by 5 per cent or more, replace hook

For more facts circle 562 on Reply Card ——→

When production plans change . . .

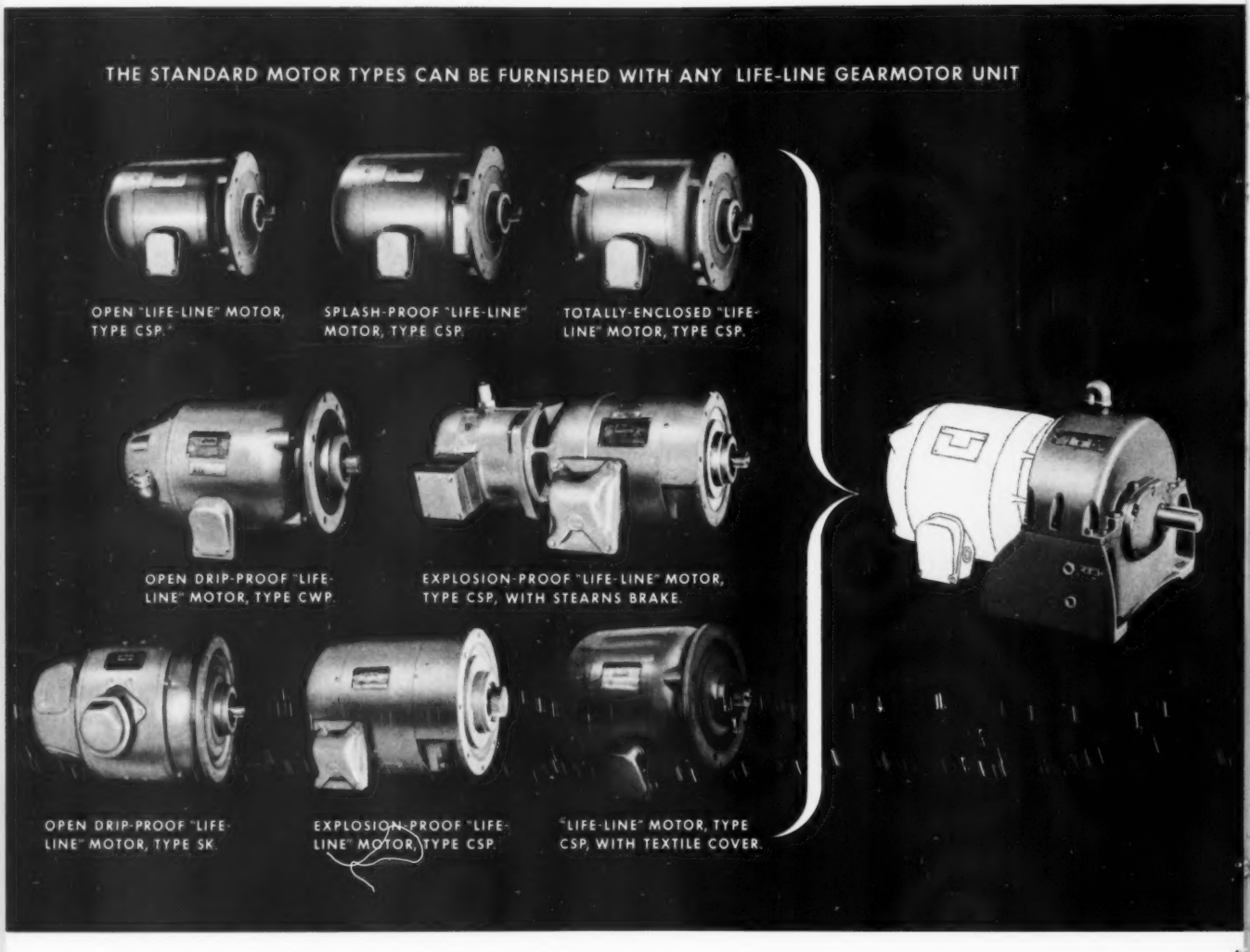
Westinghouse equipment has the flexibility necessary to adapt to new setups.



On the following seven pages, these men will show you the flexibility inherent in Westinghouse Equipment.

J. M. Elder* explains how Westinghouse Motors, Controls and Gearmotors adapt to new setups when production plans change

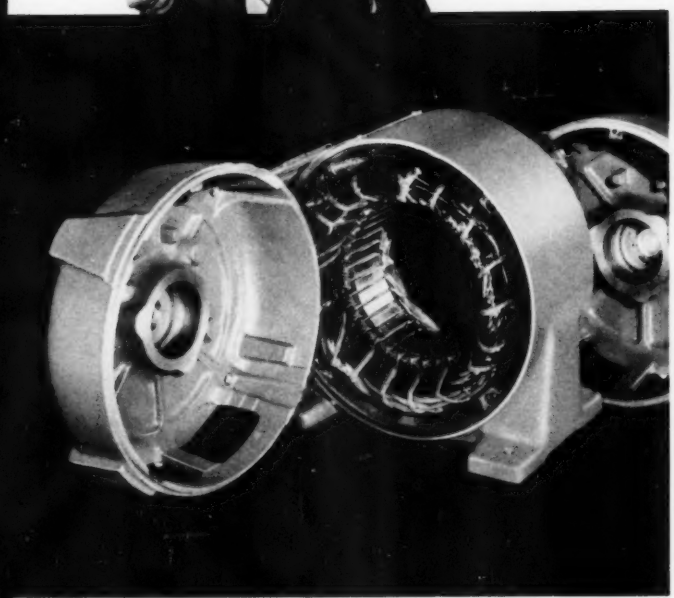
**Westinghouse Area Sales Mgr.*


THE STANDARD MOTOR TYPES CAN BE FURNISHED WITH ANY LIFE-LINE GEARMOTOR UNIT
OPEN "LIFE-LINE" MOTOR, TYPE CSP.
SPLASH-PROOF "LIFE-LINE" MOTOR, TYPE CSP.
TOTALLY-ENCLOSED "LIFE-LINE" MOTOR, TYPE CSP.
OPEN DRIP-PROOF "LIFE-LINE" MOTOR, TYPE CWP.
EXPLOSION-PROOF "LIFE-LINE" MOTOR, TYPE CSP, WITH STEARNS BRAKE.
OPEN DRIP-PROOF "LIFE-LINE" MOTOR, TYPE SK.
EXPLOSION-PROOF "LIFE-LINE" MOTOR, TYPE CSP.
"LIFE-LINE" MOTOR, TYPE CSP, WITH TEXTILE COVER.

Interchangeability of motor types makes Life-Line gearmotor flexible in application

Any of the standard Westinghouse Life-Line® motors, with same NEMA frame size, are interchangeable on a standard Life-Line gear unit designed to accommodate that motor size. Interchanging these motors is a simple matter. Just interchange the motor adapter assembly to be replaced with the similar assembly of the type of motor to be installed . . . secure the new assembly to the gear unit and the operation is completed. No realignment involved.

This advantage permits you to order your gearmotor with a type motor best suited for your application. Then, if your motor needs to be changed, you can choose the Westinghouse Motor which best meets the needs of your new requirement.

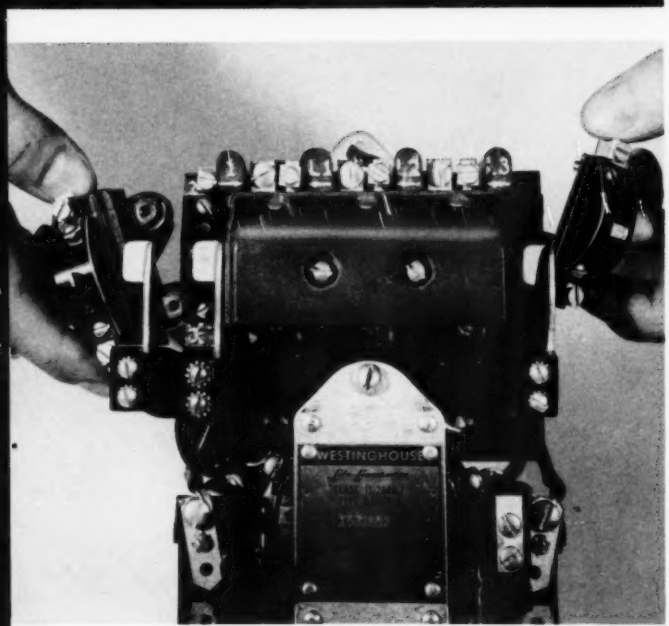


Greater protection fits Life-Line "A" motors for use wherever a totally-enclosed motor is not required

From the inside out, the new Life-Line "A" has more built-in protection. Bondar synthetic resin insulation protects conductors from heat, moisture, oil, dust, dirt and chemicals. Mylar† polyester film insulation protects coils from grounding—is eight times stronger than previous slot cells. Bondite silicone-reinforced thermoset varnish insulation protects the complete stator from water, oil and chemicals—either liquid or vapor.

Further protection is provided by the cast-iron housing that utilizes a straight-through ventilation system. There are no openings in the frame. Brackets can be rotated so that openings always face down. Thus, you can install a Life-Line "A" on floor, wall or ceiling and it will always be completely drip-proof. Actually, you can install a Life-Line drip-proof motor at many locations that previously required a more expensive design.

†DuPont Reg. Trade-Mark



Additional interlocks can be installed on the Life-Line Starter to adapt it to new circuit requirements

Many times when production plans change, the addition of new interlocking circuits is required. The Life-Line Starter is designed so that three additional normally open or normally closed auxiliary contacts, or interlocks, can be mounted on the starter without any modifications. These are in addition to the one interlock furnished which serves as the normally open holding interlock.

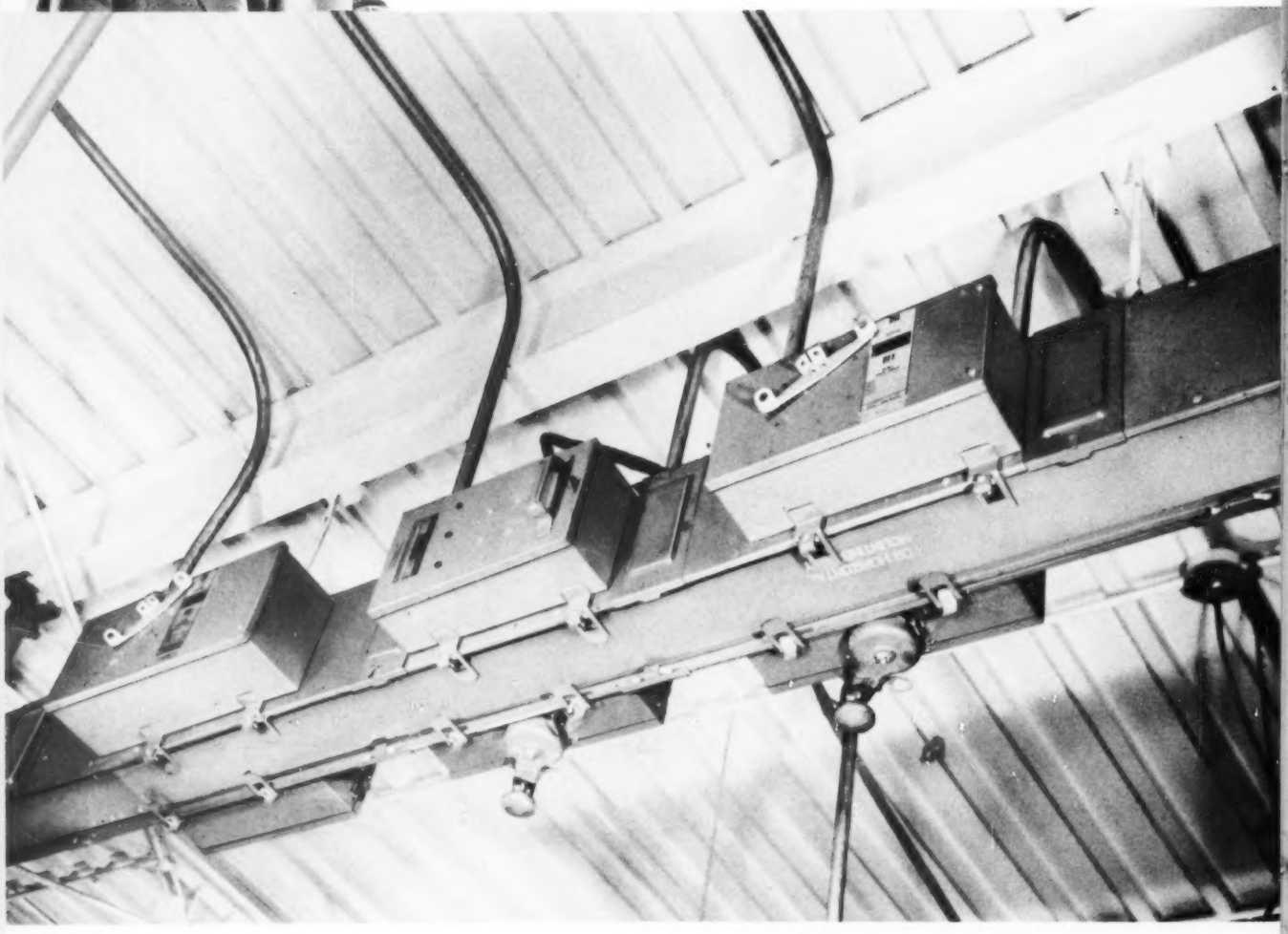
Installation is simply a matter of placing the interlocks in the provided niche and tightening a couple of mounting bolts. All interlocks can be adjusted by your own men to convert them from normally open to normally closed.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

W. G. Caputo* discusses how Westinghouse Bus Duct adapts to new setups when production plans change

**Westinghouse Bus Duct Sales Manager*

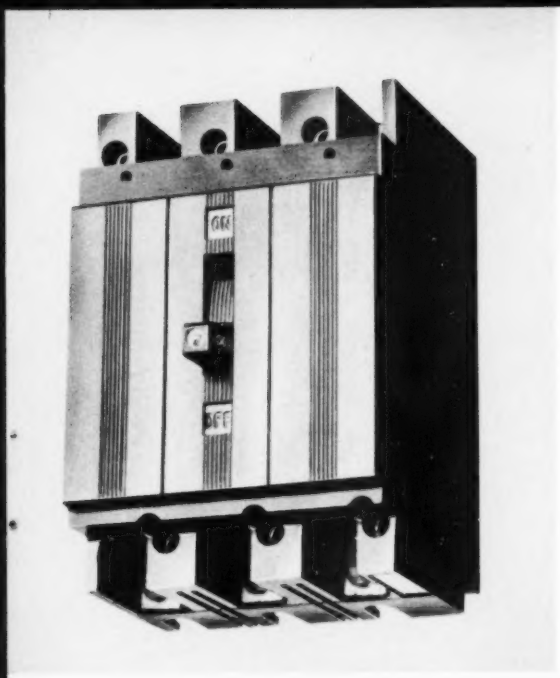


Plug-ins every foot on Westinghouse Bus Duct make it easy to provide power for new machine layouts

Loss of production caused by down time during relocation of machinery can be serious. Westinghouse Bus Duct helps minimize this loss. The flexibility of plug-ins every foot, plus a variety of power plug-in devices, makes for rapid machine tie-ins. For example, one machine tool company installed bus duct in a new wing. Then they moved 139 machine tools into new locations with less than five minutes down time per operator.

In the picture above you see six power take-offs in six feet of space. Shown are circuit breaker, safety switch and cover-operated, fusible plug-in units.

YOU CAN BE SURE...IF IT'S



Circuit breakers guard against unnecessary production outages

Westinghouse Circuit Breakers judge current, time and ambient temperatures. They trip only on dangerous overloads or short circuits, thereby eliminating all unnecessary outages. You cut expensive down time, because when circuits have been cleared after a circuit fault, a flip of the breaker handle restores service instantly. The Westinghouse line of circuit breakers includes a type and rating for any standard application—plus specials, modifications or accessories for unusual operating conditions.

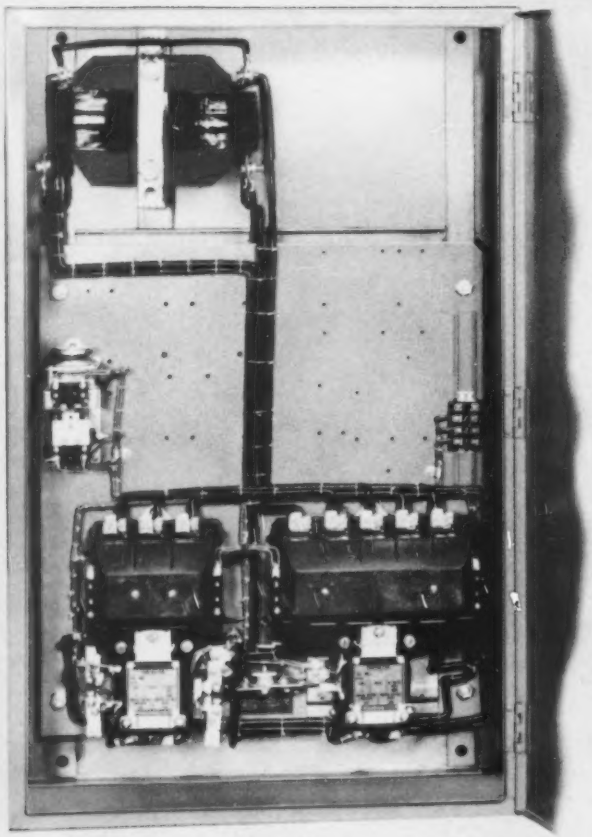
Where installation dictates the use of enclosed circuit breakers, you will welcome the new Westinghouse Packaging Plan. Enclosures and breakers are now being packed and stocked as two separate items. This new packaging plan enables your Westinghouse Distributor to offer you a complete line of AB-I Circuit Breakers quickly, right from the shelf. You are assured of fast delivery to meet critical job dates.

But here's another important point. Dual packaging speeds installation. It eliminates removing the breaker unit from the enclosure in order to run conduit and pull in cable. The breaker unit stays packed until it is ready for mounting. Danger of damage or loss in handling is greatly reduced.

Westinghouse

Russ Staggs* shows how flexible control panels adapt to new circuits when production plans change

**Westinghouse Add-A-Part Panel Sales Manager*



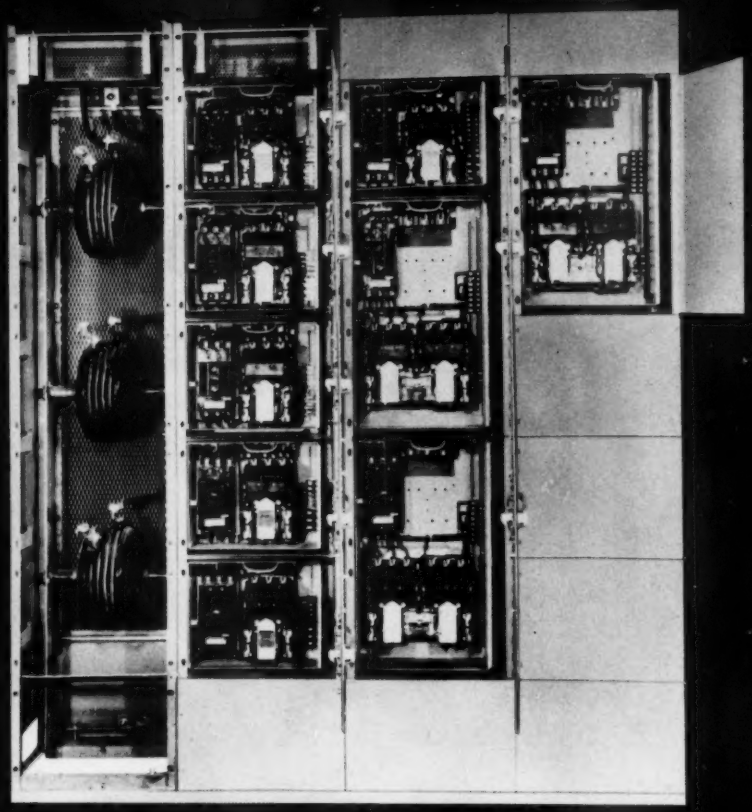
New sequencing cycles, new remote control stations, new relay operations, new limiting devices—are but a few of the circuit problems that arise when production plans change. Realizing this, Westinghouse offers a line of control panels that is designed to permit easy changes of control components.

The foundation for each control is the mounting panel. This panel is designed to accommodate a wide variety of components. The building blocks are the complete line of Westinghouse Control Components. Individual components can be removed from or added to the panel as circuit requirements change.

The Westinghouse Add-A-Part Panel is a typical example of this type of flexible control. Standard starter panels, like the one pictured, are provided with mounting holes so that additional relays, fuses, voltage and current transformers may be added on the spot without changing the size of the enclosure.

No other electrical manufacturer offers this advantage in flexibility, this saving in time and money.

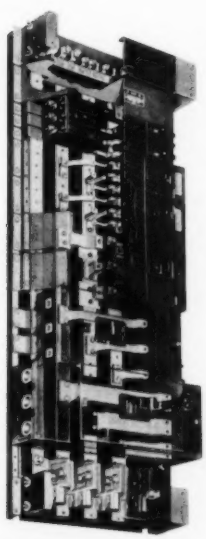
YOU CAN BE **SURE**...IF IT'S **Westinghouse**



Standard modular dimensions of starter units on Westinghouse Control Centers facilitate interchangeability

Starter units on Westinghouse Control Centers have a standard width and depth and are built to a modular height of 14″. Unit heights vary from 14″ to 70″ in multiples of 14″, thus permitting two single units to be interchanged with a double unit, three single units to be interchanged with one triple unit, etc. . . . no wasted space . . . no cramping.

All control devices necessary for any motor operation can be housed and coordinated in a Westinghouse Control Center. Shown above is one standard combination of control and protective equipment . . . grouped efficiently and compactly in a control center. The possible number of such control arrangements is practically unlimited.



Pre-drilled busbars on Westinghouse Panelboards permit on-the-job change-over of circuit breakers

Outmoded circuit protection and slow change-over can inflict double penalty on production schedules today. It's easy to make necessary circuit changes on the job with Westinghouse Circuit Breaker Panelboards—safely, quickly.

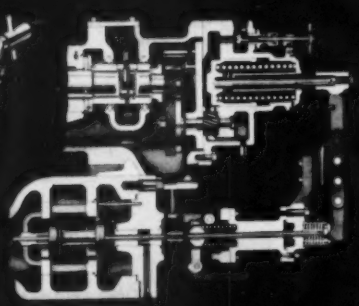
Indicating trim clamps make it easy to get the trim off. Since change-over parts are identical, a precise fit is insured. Pre-tapped busbars and back pans eliminate any necessity for drilling, tapping or machining. Westinghouse Convertible Distribution Panelboards feature screw driver convertibility.

Here's how to get precision power when plans call for the efficient use of steam

Now, you can economically handle all steam-drive applications with Westinghouse turbines. Designed for the full range of steam conditions, power, and speeds, they provide precision power for almost any requirement. Careful component standardization means turbines tailored to your application, using standard parts. The result—custom performance with standardized parts reliability; fewer spare parts because many parts are interchangeable. The turbine governors shown below typify this unequaled flexibility—your assurance of more turbine per dollar—more performance per turbine.

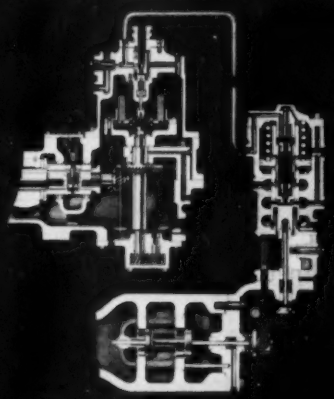
FOR CLOSE-LIMIT SPEED CONTROL

This centrifugal-weight governor automatically positions the steam admission valve to control turbine speed within close limits—between 6 and 8 percent speed regulation. When equipped with a hand speed changer, this governor permits speed adjustment up to 20 percent of the rated speed.



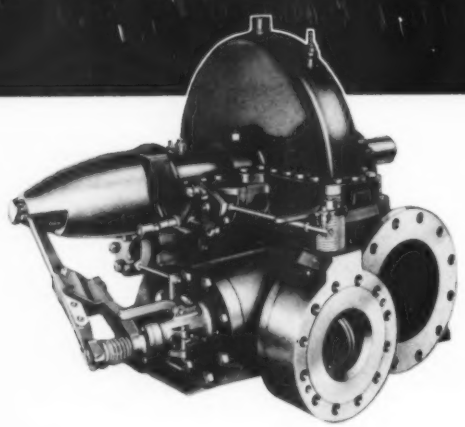
FOR VARIABLE-SPEED APPLICATIONS

The hydraulic-orifice governor provides a 3 to 1 maximum speed adjustment and a speed regulation of 6 percent. The hydraulic-orifice type is particularly suited for variable-speed applications, such as drives for fans, blowers and compressors.



FOR WIDE RANGE PRECISION CONTROL

The vertical oil-relay governor affords speed regulation of 4 percent and may be provided with a maximum speed adjustment of 3 to 1 with integral pump . . . and higher with a separate motor-driven pump. It is a frictionless centrifugal-weight, speed responsive element combined with an oil pump and servomotor.



If you're thinking of expansion or modernization, call your Westinghouse Representative when planning begins. Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

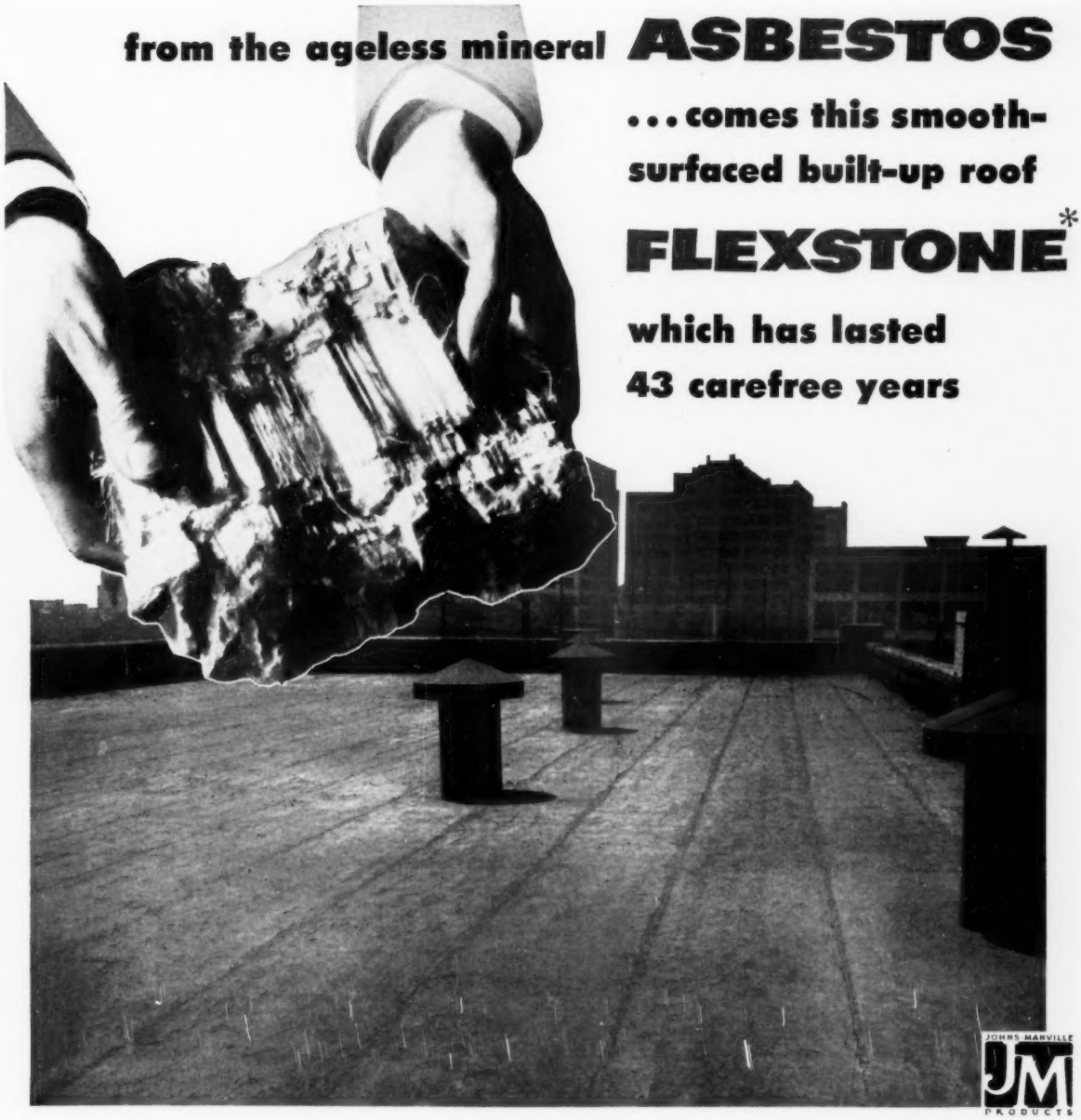
MP-3016

from the ageless mineral ASBESTOS

...comes this smooth-surfaced built-up roof

FLEXSTONE*

which has lasted 43 carefree years



JOHNS MANVILLE JM PRODUCTS

The Johns-Manville Flexstone Built-Up Roof shown above was installed in 1911 when the building was erected. For 43 years, the owner reports, it has given continuous service without repairs or replacements.

Because they are made of the mineral, asbestos, the felts of a J-M Flexstone Built-Up Roof assure lasting service and protection. They will not support combustion. They effectively resist the drying-out action of the sun . . . won't rot, are weatherproof and need no periodic coating.

J-M Flexstone Built-Up Roofs are smooth-surfaced . . . permit thorough drainage, make any damage easy to locate and repair. They are engineered to each job . . . and can be applied on decks ranging from dead level to a pitch of 6 inches per foot.

For complete information about Flexstone Roofs and J-M Asbestile* Flashing System that provides thorough water tightness and effective treatment for critical roof areas, see your Approved Johns-Manville Contractor. He's listed in the Classified Section of the telephone directory. Or send for folder BU-51A. Write Johns-Manville, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ont.

*Reg. U. S. Pat. Off.

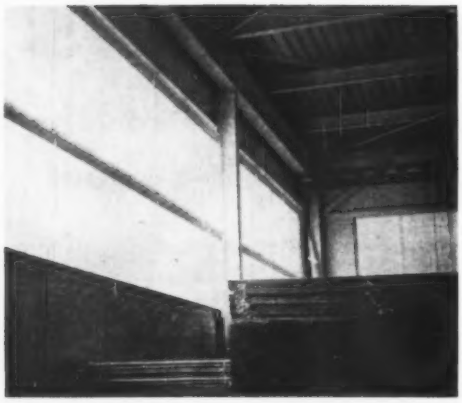
Made of ASBESTOS

Johns-Manville FLEXSTONE* Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS • DECORATIVE FLOORS • MOVABLE WALLS • ETC.

For more facts circle 563 on Reply Card

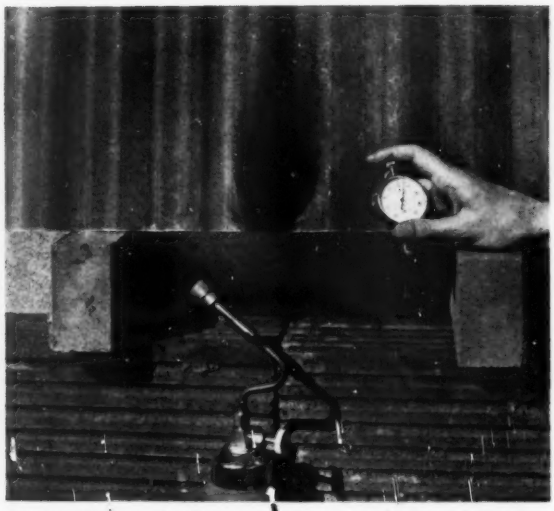
←For more facts circle 562 on Reply Card



Buildings where open piles of highly inflammable material cause severe fire hazards may now use these flame-resistant translucent plastic panels

Fire-Resistant Plastic Building Panels Here

Blow torch being applied directly to the edge of this new translucent structural panel. Flame will slowly ignite resin



Five seconds—note the stop watch—after source of heat and flame have been removed flames on panel are extinguished

PRACTICALLY ALL industrial plants contain areas where specifications call for a definite flame-spread rating to meet building code requirements. Sometimes insurance inspectors will demand the application of materials to render certain areas less vulnerable to flame spread.

Recently announced was the availability of a self-extinguishing sheet of glass-fiber-reinforced translucent structural sheet, called Fire-Snuf, for applications to such areas. They are not designed to replace standard sheets in building, but to supplement them.

These new panels are molded by Resolite Corporation from "Hetron" a permanently self-extinguishing resin manufactured by Hooker Electrochemical Co. Their flame-spread rating of 75 is in a bracket termed "slow-burning" by the Building Official Conference of America, Inc. As a comparison, the flame-spread rating for red oak is 100.

Under the heat and flame of a blow torch the new material will burn but it extinguishes itself almost immediately (see photos) upon removal of the source of flame.

These panels are reported to retain all the characteristics of the company's standard panels—high strength, stability and load-bearing characteristics—and to have permanent flame-resistance chemically locked in.

The panels are molded in all standard metal and asbestos roofing and siding corrugations including V-beam and V-crimp. It is available in all sheet sizes and normal skylighting colors. It costs a few cents more per square foot than does standard sheet.

Want More Information?

If you would like more data on this material just drop a line to The Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill. or write "Fire-Snuf" on the postage-paid card elsewhere in the issue, and mail it.

. . . eliminate dust with WESTONE!

Dramatic proof of ANTISEPTIC WESTONE'S effectiveness. The hand at left was rubbed across an ordinary untreated section of floor. The hand at right was rubbed over a section which had been treated with dust-controlling ANTISEPTIC WESTONE.

Sweeping only rearranges dust. As a matter of fact, sweeping and floor traffic are the main dust spreaders—not open doors and windows as you might think. And dust is damaging. It spreads many harmful disease bacteria that often cause absenteeism. It affects precision apparatus and delicate finished products. Makes store merchandise, office and institutional floors unsightly.

ANTISEPTIC WESTONE CONTROLS DUST. Loosens and picks it up from floors, bins, shelves, furniture. Seals floor surfaces. Improves their appearance. Holds down subsequent dust so traffic can't raise it. Its antiseptic properties inhibit growth of bacteria.

ANTISEPTIC WESTONE is economical. It works as fast as a man can walk. One man can do the work of three in maintaining floors. And it goes a long way. One gallon covers 4,000 square feet. Interested? Check the coupon.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

WANT DETAILS?

Tear out this coupon and mail with your letterhead

Dept. 52

I'm interested in:

☐ A FREE leaflet on WESTONE.

☐ A talk with a West expert about my special floor problems. No sales pitch. No obligation. Just discussion and a demonstration if I want it.

For more facts circle 564 on Reply Card

ROTARY PUMPS
Selection, Care and Use...Part II

Millions of dollars are wasted each year due to improper selection and application of rotary pumps . . . Author enumerates the operating conditions to consider before selecting a rotary pump that will suit a specific job

By W. J. MONGON, De Laval Steam Turbine Co., Trenton, N. J.

SELECTING A rotary pump for a specific application is not difficult if all the operating conditions are known. It is a common belief, however, that since a rotary pump is a positive displacement device, operating conditions, particularly, inlet conditions and viscosity, are not important factors. It must be stressed that these factors are just as important in the selection of a rotary pump as they are for other pumps.

In any rotary pump application, suction lift, viscosity and speed are inseparable. In order to insure quiet, efficient operation it is necessary to completely fill the compartments in the pumping elements with fluid as they open, and this becomes more difficult as viscosity or suction lift increases.

Basically, once the fluid reaches the pumping elements, discharging it poses no serious problem. The real problems are on the suction side of the pump—getting the fluid in. Speed of operation, therefore, is dependent on viscosity and suction lift. If these two factors are known, the problem of selecting a suitable pump becomes infinitely simpler and an efficient installation can be insured.

It is not very often that a rotary pump is called upon to handle fluids of constant viscosity. Normally, temperature variations produce a range of viscosity. It is not unusual that a pump is required to handle a viscosity range of 150 to 20,000 SSU, the higher viscosity usually being due to cold starting conditions. This is a perfectly satisfactory range for a rotary pump.

However, if information can be obtained concerning such factors as the amount of time the pump is required to operate at the higher viscosity, whether the motor can be overloaded temporarily, a multispeed motor used, or the discharge pressure reduced during this period, a better selection can be made.

Quite often no viscosity is given but only the type of fluid. In such cases assumptions can sometimes be made if sufficient information is available concerning the fluid. For instance, Bunker C or No. 6 fuel oil is known to have a wide viscosity range and usually must be handled over a considerable temperature range. The normal procedure in a case of this type is to assume an operating viscosity range of 20 to 700 SSF. The maximum viscosity, however, might very easily exceed the higher value if extra-heavy oil is used or exceptionally low temperatures are encountered. If either should occur the result may be improper filling of the pumping elements, noisy operation, vibration, and overloading of the motor.

Although it is the maximum viscosity and the expected suction lift that determines the size of the pump and sets the speed, the minimum viscosity determines capacity. Rotary pumps must always be selected to give the specified capacity when handling the expected minimum viscosity since this is the point at which maximum slip, hence minimum capacity occurs.

If this rule is not followed the pump will not meet the requirements of the system unless a considerable margin has been allowed initially in specifying capacity, or there is over-capacity available in the pump. The latter is often the case, since practically all rotary pumps are made in certain stock sizes and it is standard practice to apply the next larger pump when a capacity is specified that falls between sizes.

It should also be noted that the minimum viscosity often sets the model of the pump selected, since it is standard policy on the part of most manufacturers to down rate their pumps, insofar as allowable pressure is concerned, when handling liquids having a viscosity of less than 100 SSU. This is done to avoid the poorer volumetric efficiency as a result of

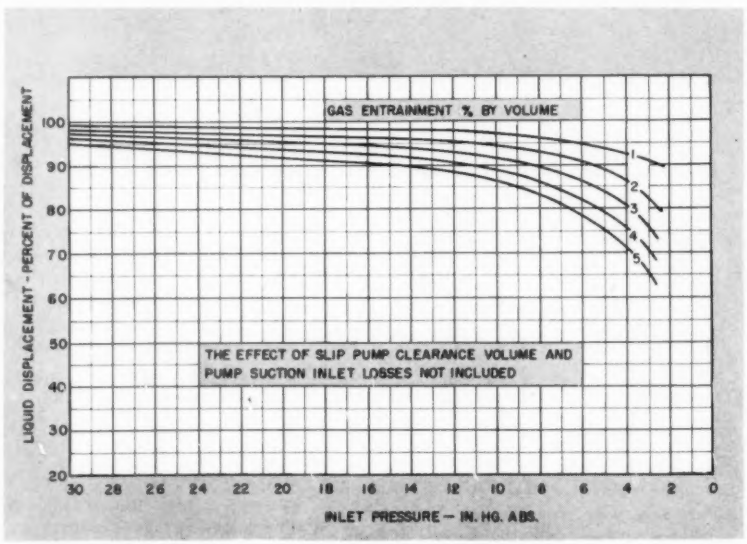


Fig. 1. Effect of entrained gas only on liquid displacement of rotary pumps

Easy to Install

generous wiring space,
accessible terminals,
numerous knockouts,
white interior

Allen-Bradley starters are easy to install . . . which is at least one good reason why they are so popular with installation engineers and maintenance men.

In addition, cabinets are generously proportioned to provide plenty of room for wiring. You'll lose no skin when wiring an Allen-Bradley starter! Then, too, the white cabinet interior provides excellent visibility even in dark corners. With all starter terminals right up front, they're easy to get at . . . easy to connect. Likewise, knockouts are where you want them . . . easy to punch out! No wonder Allen-Bradley starters take less time to install.

It is to your interest to insist on Allen-Bradley starters. Don't forget—they are trouble free, too, good for millions of operations. No contact maintenance is required.

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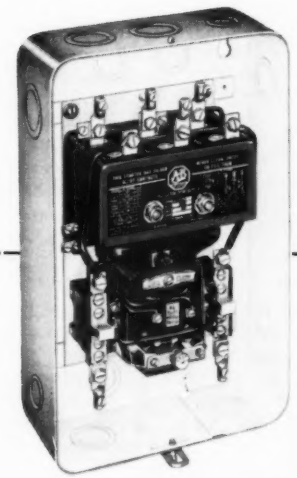
ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

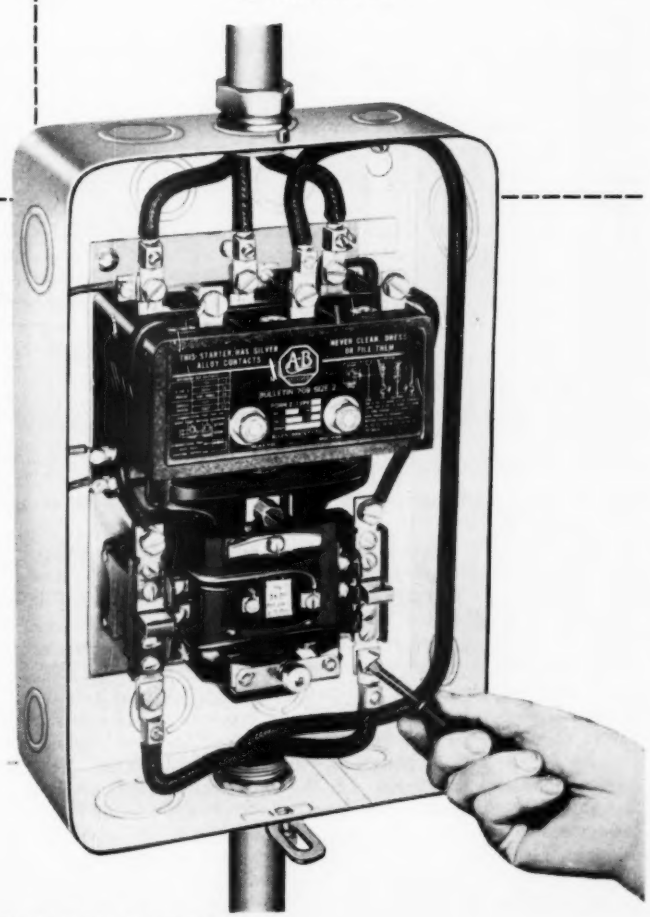
QUALITY



Bulletin 709 Solenoid Starter, Size 2. Max Ratings: 15 hp, 220 v; 25 hp, 440-550 v.

A-B Quality

The Sign of Quality Motor Control



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increased slip under these conditions and because a film of the liquid must be maintained between the closely fitted parts. This film is likely to break down if a combination of low viscosity and high pressure should occur.

A factor which must also be given consideration is the possibility of entrained air or gas in the fluid to be pumped. This is particularly true of installations where recirculation occurs and the fluid is exposed to air either through mechanical agitation, leaks or improperly located drain lines.

Likewise, most fluids will also dissolve air or gas, retaining it in solution, the amount being dependent on the liquid itself and the pressure to which it is subjected. It is known for instance, that lubricating oils under conditions of atmospheric temperature and pressure will dissolve up to 10 per cent air by volume, and gasoline up to 20 per cent.

When pressures below atmospheric exist at the pump inlet, dissolved air or dissolved air or gas is noisy pump operation. When such a condition occurs it is usually dismissed as "cavitation." Noisy operation is inefficient operation and steps should be taken to make corrections until the objectionable conditions are overcome. It is true, of course, that some types of pumps are more critical to the handling of air than others, this is usually due to the high inlet losses which are characteristic of these types. Proper design and speed selection will greatly help overcome this problem.

The viscosity of most liquids, such as water and mineral oil, are unaffected by agitation as long as the temperature remains constant. They are "true" or "Newtonian" fluids.

There is, however, another class of liquids such as cellulose compounds, glues, greases, paints, starches, etc., which decrease in viscosity as agitation is increased at constant temperature. These are known as "thixotropic."

A third group known as "dilitant" are liquids that increase in viscosity

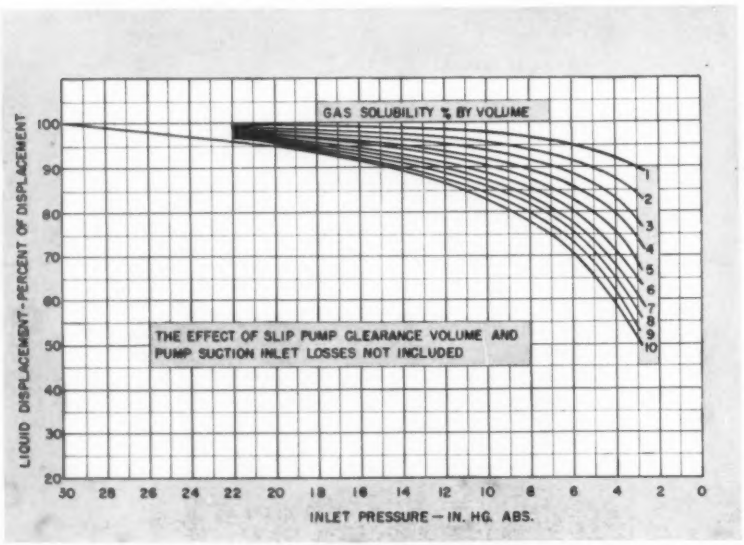


Fig. 2. Effect of dissolved gas only on liquid displacement of rotary pumps

will come out of solution and both this and entrained air will expand in proportion to the prevailing absolute pressure. This expanded air will accordingly take up a proportionate part of the pump displacement volume with a consequent reduction in delivered capacity.

It should be pointed out, that if a pump will be called upon to handle fluids containing entrained air this fact should be included in any specifications which may be written and the percentage specified.

One of the apparent effects of handling fluids containing entrained as agitation is increased at constant temperature. Such liquids are clay slurries, candy compounds, and the like.

If a liquid is known to be thixotropic or dilitant the expected viscosity under actual pumping conditions should be determined. The following is an example of what could happen if this is not determined. In a known case concerning the handling of cellulose product where the viscosity was given as 20,000 SSU, which was its actual static, or apparent viscosity, it later developed that under actual pumping conditions the viscosity was approximately 500 SSU. No serious harm was done, but a more expensive large, low speed pump was installed where a smaller and higher speed unit could have been used.

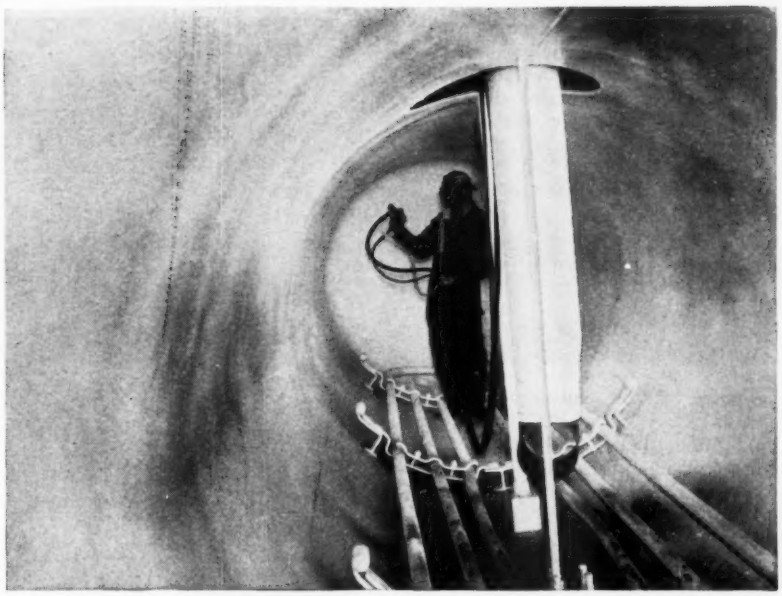
To avoid the possibility of a similar error, the plant engineer should study the data taken from a similar installation. Such information should consist of type, size, capacity and speed of pumps already installed. Suction pressure and temperature at the pump inlet flange, total working suction head, and above all the pressure drop in a specified length of piping should also be included. From the latter, an excellent approximation of viscosity under actual operating conditions can be obtained.

Suction lift occurs where the total suction head at the pump inlet is below atmospheric pressure. It is normally the result of a static lift and pipe friction. Although rotary pumps are capable of producing a high vacuum, it is not this vacuum that forces the fluid to flow. As previously explained, it is atmospheric pressure that forces the fluid into the pump. Since atmospheric pressure at sea level corresponds to 14.7 psia, or 30-in. Hg, this is the maximum amount of pressure available for moving the fluid and suction lift cannot exceed these figures. Actually it must be somewhat less, since there are always pump inlet losses which must be taken into account. It is considered the best practice to keep suction lifts as low as possible.

Suction Lift

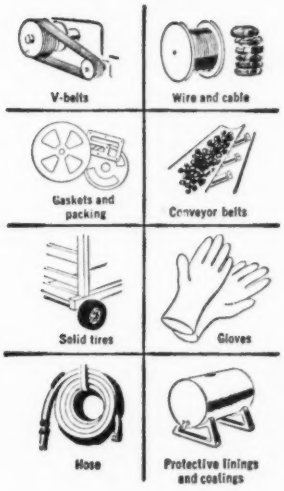
The majority of rotary pumps operate with suction lifts of approximately 5 to 15-in. Hg. Lifts corresponding to 24 to 25-in. Hg are not uncommon and there are numerous installations operating continuously and satisfactorily where the absolute suction pressure is within one half inch of the barometer. In the latter case, however, the pumps are usually taking the fluid from tanks under vacuum and no entrained or dissolved air or gases are present. Great care must be taken in selecting pumps for these applications since the inlet losses can very easily exceed the net suction head available for moving the fluid into the pumping elements.

When a pump is to handle extremely viscous fluids, such as grease, chilled shortening, cellulose mixtures and similar materials, it is wise to review the basic considerations. The largest possible size suction piping should be used, all unnecessary fittings and valves should be eliminated, and the pump should be placed as near as possible to the source of supply. It may also be necessary to supply the



Neoprene tank car coatings give over 4½ years' service in shipping hot caustic

SPECIFY NEOPRENE IN THESE PRODUCTS:



As industry's use of pure, rayon-grade caustic soda has increased over the years, so has the problem of preventing iron contamination to the caustic during shipment in steel tank cars. Linings based on neoprene latex have proved to be the answer in keeping tank car contents pure. Columbia Southern Chemical Co., one of the country's large caustic producers, reports that in transporting 50 and 73 per cent solutions, these durable neoprene coatings give them more than 4½ years' protection.

Temperatures for the caustic run as high as 250°F. on loading and 170°F. at point of delivery. Yet the rugged neoprene linings resist deterioration from the caustic . . . retain their effectiveness trip after trip. Columbia has had similar success in coating tank car exteriors and lining caustic storage tanks. In both cases, neoprene is giving over 3 years' service.

Other leading caustic producers are using these versatile coatings in similar capacities. It's a good example of the way neoprene solves problems common to industry—and you can rely on that same kind of performance with other neoprene products—V-belts, hose, gloves and conveyor belts. Although Du Pont makes no finished goods of neoprene, your rubber goods supplier will gladly tell you about the neoprene products he sells.

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fluid to the pump under some pressure provided by elevation, air or mechanical means, such as a screw conveyor.

It was previously stated that viscosity and speed are closely related and it is impossible to consider the one without the other. Although rotative speed is the ultimate outcome, the basic speed which the manufacturer must consider is the velocity of the fluid going through the pump; this is a function of pump type and design.

Velocity of Fluid

Certain types such as gear and vane pumps carry the fluid around the periphery of the pumping elements and as a result the velocity of the fluid through the pump can become quite high unless relatively low rotative speeds are used. In screw type pumps because the flow is axial, lower fluid speeds are obtained which permits higher rotative speeds.

In handling very light fluids, say 100 to 500 SSU, gear or vane type pumps rarely exceed a rotative speed of 1200 rpm, except in the case of very small units or special designs for a particular use as in aircraft applications. Screw pumps, however, where timing gears are not required, commonly operate without difficulty at speeds up to 5000 rpm and there are instances where special designs are operating at speeds of approximately 24,000 rpm taking oil under lift from a sump tank located below the pump.

Although rotative speeds are relative and dependent on the pump type, they usually should be reduced when handling fluids of high viscosity. This is due not only to the difficulty of filling the pumping elements, but also to the mechanical losses which result from the shearing action of these parts on the fluid handled. The reduction of these losses is frequently of more importance than relatively high speeds, even though the latter might be possible due to positive inlet conditions.

Base Loss on Maximum Viscosity

In general, the losses for a given size and type of pump vary with the viscosity and rotative speed and may or may not be affected by pressure, depending on the type of pump under consideration. These losses, however, must always be based on the maximum viscosity to be handled, since they will be highest at this point. If this is not done, the resultant calculated horsepower will be too low and a motor selected on this basis will probably be overloaded.

The other factor that determines the horsepower required to drive the pump is the actual work done in converting the fluid from its pressure condition on the inlet side to its corresponding condition on the outlet side. Since this work is done on all of the fluid, (this must be so because slip does not exist until a pressure differential occurs) the volume which must be considered is not the delivered capacity but the actual displacement volume, or theoretical capacity, of the pump. Any number of formulae can be devised for calculating this value, known as the "theoretical liquid horsepower," depending on the units in which capacity and head or pressure, are expressed. It should be noted that the theoretical liquid horsepower is independent of viscosity and is concerned only with the physical dimensions of the pumping elements, the rotative speed and the total pressure.

The brake horsepower required, is the sum of the theoretical liquid horsepower and the mechanical loss.

Rotary pumps are available in a wide variety of pressure ranges. Although most rotary pumps are used for applications requiring less than 150 psi, a wide field exists for a great many up to 500 psi. Many are also built for hydraulic service on machine tools where presure up to 3000 psi are encountered.

Rotary pumps do not in themselves create pressure, they simply transfer a quantity of fluid from the inlet to the outlet side. The pressure developed on the outlet side is solely the result of resistance to flow in the discharge line. If a pump were to be set up and run without a discharge line, a gage placed at the pump outlet flange would register zero no matter how fast or how long it was run.

Resistance usually consists of differences of elevation, fixed resistances such as orifices, and pipe friction. Nothing much can be done about the first two since these are the basic reasons for using a pump, something however, can be done about pipe friction.

Literally millions of dollars are thrown away annually due to the use of piping that is too small for the job. To be sure, all pipe friction cannot be eliminated as long as fluids must be handled in this manner, but every effort should be made to use the largest pipe that is economically feasible. Numerous tables are available from which friction losses in any combination of piping may be calculated, among the most recent of which are those published by the Hydraulic Institute. Also available are the services of pump specialists provided by pump manufacturers.

Before any new installation is made, the cost of larger size piping, which will result in lower pump pressures, should be carefully balanced against the cost of a less expensive pump, smaller motor, and a saving in horsepower over the expected life of the system. The larger piping may cost a little more in the beginning but the ultimate savings in power will often many times offset the original cost.

(Continued on page 186)

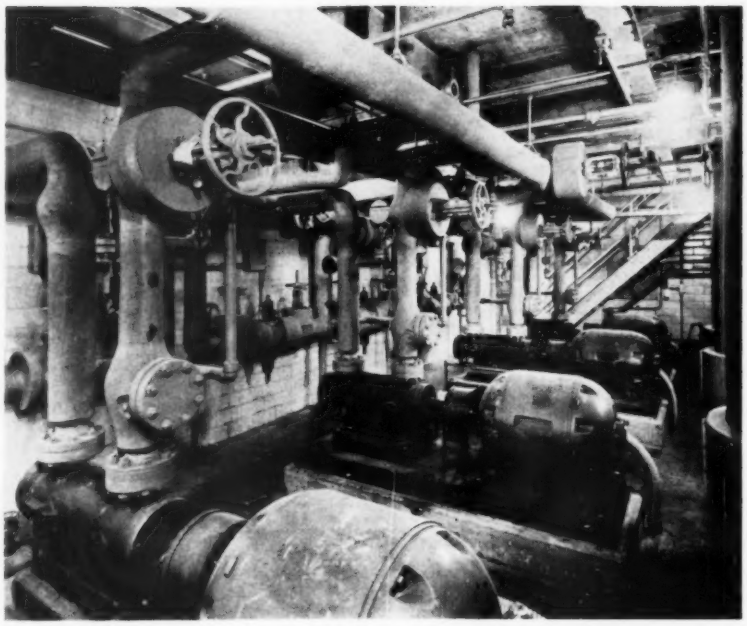


Fig. 3. View shows a battery of rotary pumps in fuel oil service in a power plant. These are the constant displacement, screw-type with only three moving parts

SNYDER TANK CORPORATION REPORTS...

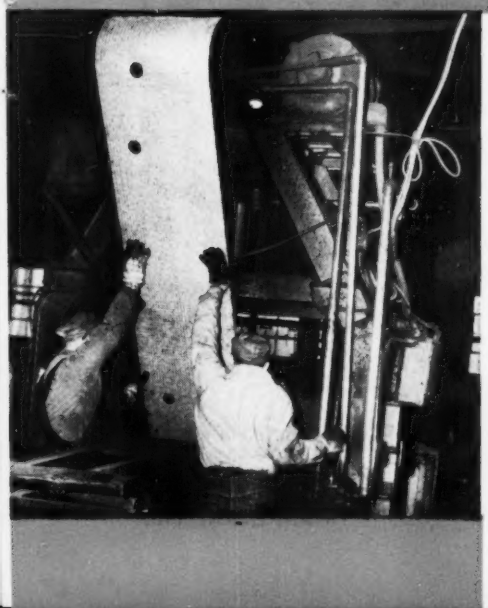
J&L Junior JAL-TREAD

Fabricates easily, economically
Provides neat, safe walking surface

Snyder Tank Corporation of Buffalo, New York, recognizes the importance of a safe footing for truck drivers when they climb into the cab or adjust the hitch. That's why, for almost ten years, the top surface of Snyder gasoline truck tanks has been made of non-slip J&L Junior Jal-tread floorplate.

Referring to the use of Junior Jal-tread on late model trucks where fuel tanks replace running boards, E. F. Olson, Sales Manager, says, "It is important to have a safe walking surface here also, because the driver must enter and leave the cab by stepping on the tank. From a customer point of view, the plate (J&L Junior Jal-tread) is neater looking too."

Regarding production costs Francis Snyder, Plant Superintendent, reports that he has less trouble fabricating J&L Junior Jal-tread than other types of steel. He adds that Jal-tread's straight line pattern of raised cleats cuts spoilage and makes fabricating, forming, punching and bending easier.



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Whatever your application in new construction, new equipment or replacement jobs, you'll find that J&L Jal-tread and Junior Jal-tread offer floorings that are long-lasting, safe, neat, easy-to-clean and easy-to-fabricate. Check the advantages of Jal-tread, the only true checkerboard floorplate, today.

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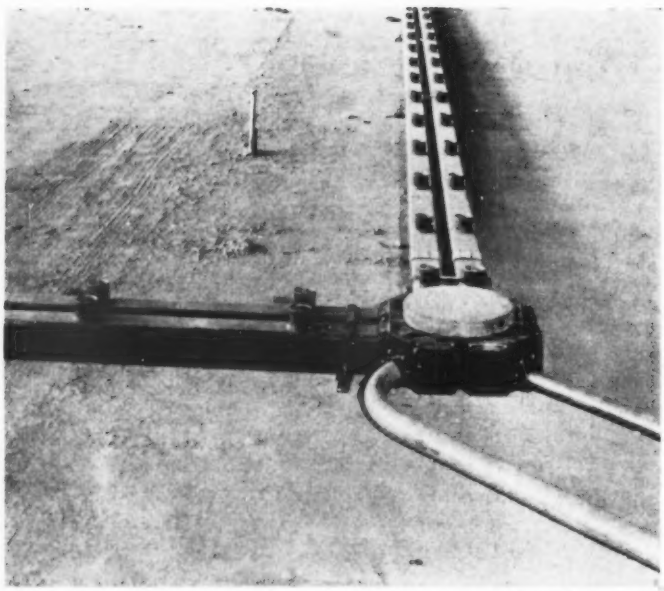

Fig. 1. Illustration shows an industrial installation of this underfloor duct system to help meet this plant's increased electrical demands

For Heavy-Duty Wiring— Underfloor Raceway With Tripled Capacity

HERE IS A new underfloor electrical raceway to help take care of the heavy demand on an industrial plant's electrical distribution system.

Made of 14-gage cold rolled steel, the raceway with a 4 by 4 in. cross section, is designed for heavy-duty wiring in industrial plants where overhead wiring would interfere with normal operations.

With more than three times the capacity of standard underfloor ducts, the manufacturer says this greater capacity allows a flexibility in plant layout which is not possible with the capacity of standard underfloor raceways. Plant electrical installations which have an extensive distribution system will find it possible to plan a variety of machinery emplacements, since all areas will be adequately served by electrical outlets.

Several installations of this Nepcoduct have already been made in an industrial research laboratory, an assembly shop and a food processing plant, all of which placed heavy demands on an electrical distribution system.

It is available in standard 10-ft lengths and provides 2 in. pipe size, threaded outlets on 24-in. centers, permitting the direct insertion of conduit for stand-pipe service fittings. Complete with junction boxes and a full complement of fittings, the duct is a fully grounded, industrial underfloor wiring system.

If you want more information on this underfloor raceway, just write the Editor, Plant Engineering, 110 South Dearborn St., Chicago 3, Illinois, or indicate "Nepcoduct" on the bottom of the postage-paid card in this issue.

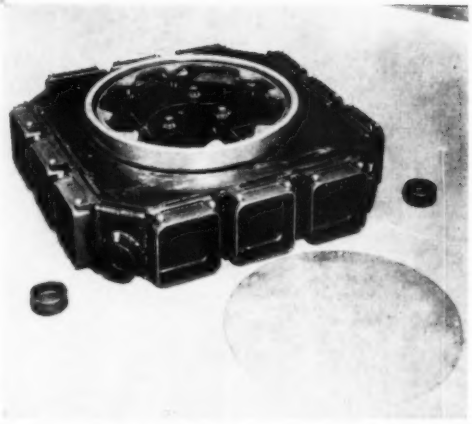

Fig. 2. This three-duct junction box permits the tie-in of an intricate system of underfloor raceways. This equipment as well as a full complement of fittings are available for underfloor wiring system

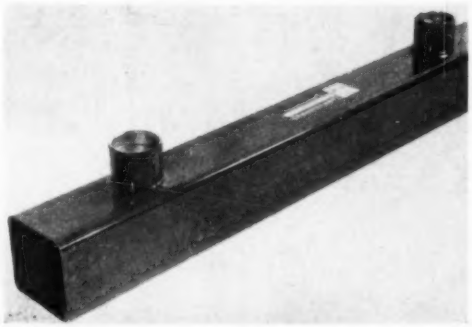

Fig. 3. Close-up of a section of the 4 by 4 in. raceway. This raceway, made of 14-gage cold rolled steel, is designed for heavy-duty wiring of plants where overhead wiring systems are not practical

How Well Does Your Present Source Compare With National's COMPLETE Facilities For Motor and Generator Repair

Most motor repair shops can perform some of the operations listed below. Very few can handle them all. These are not routine operations, but extras which require expensive specialized equipment and experience. National service includes all 17 operations. How does your present repair source compare?

plus value operation	*available at National*	*at your present repair source*
1. redesigning and modernizing by competent engineers	yes	
2. vapor degreasing to insure good bonding of varnish	yes	
3. corncob blasting to prepare surfaces like new	yes	
4. rebuilding and remachining to standard of mechanical fits	yes	
5. temporary hotbanding to seat coils in slots	yes	
6. hot rerolling of permanent bands	yes	
7. grinding and polishing of journal shafts	yes	
8. vacuum impregnating	yes	
9. dynamic balancing	yes	
10. grinding and polishing of commutator at top operating speed	yes	
11. load testing	yes	
12. high frequency testing	yes	
13. electronic bar-to-bar and high sensitivity ductor testing	yes	
14. surge comparison testing	yes	
15. high potential ground testing	yes	
16. magniflux testing	yes	
17. anti-friction bearing inspection	yes	
Total	17	

If you can't answer "yes" for your present source on all 17 operations, you're taking unnecessary chances on getting less than the best repair work. You can't tell in advance on which jobs National equipment and National know-how will pay off in improved performance or longer life. So play it the one safe way — make National your first source for *all* motor and generator repairs.

For more details on why the motor or generator you send to National will often come back better than new, call your nearby National field engineer today. Or drop us a line for his name and address.

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ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

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NEW PLANT CONSTRUCTION — advance information on location, costs

Prepared by Le Roy W. Allison

Coosa Pines, Ala.—Coosa River Newsprint Co. has approved plans for expansion of its local newsprint mill, including new multi-story building and installation of equipment. Cost reported about $500,000 with machinery. Work will begin soon.

Anaheim, Calif.—Menasha Container Corp., subsidiary of Menasha Woodenware Corp., Menasha, Wis., has plans for a new plant at Anaheim. It will be a one-story building with approximately 175,000 sq ft floor space, and will manufacture corrugated paper containers of various kinds. Cost reported to be about $2,500,000. Work on superstructure will begin at early date.

El Monte, Calif.—Kyle Steel Co., Los Angeles, Calif., steel products, has authorized plans for new plant on Durfee Ave., near El Monte, comprising two one-story buildings, 72 by 420 ft and 84 by 480 ft. In addition to fabricating equipment, installation will include traveling cranes, hoists and other mechanical-handling facilities. Cost reported over $250,000.

Interior daylighting in this plant is supplied by skylights and sidewall lights of corrugated and flat Resolite panels

Fairfield, Conn.—Bridgeport Hardware Mfg. Corp., Bridgeport, Conn., hand tools and other hardware products, has approved plans for new one-story plant at Fairfield, reported to cost about $750,000. Work on superstructure will begin soon. Herbert C. Elton, Bridgeport, is architect.

Oakville, Conn.—Autoyre Co., Oakville, stamped metal goods of various kinds, wire products, has plans for two new one-story additions to plant, 122 by 142 ft and 92 by 212 ft, respectively. Cost reported about $650,000. Work on superstructure will begin soon. Fletcher-Thompson, Inc., Bridgeport, Conn., is architect and engineer.

West Hartford, Conn.—Niles-Bement-Pond Co., Pratt & Whitney Div., lathes, planers and other machine tools, has plans for one-story addition to plant, with certain other plant extensions. Cost reported about $600,000. Work on superstructure will begin soon. Rossetta & DiCorcia, Bristol, Conn., are architects.

Albany, Ga.—A. M. Karagheusian, Inc., Albany, cotton and rayon pile carpets and rugs, has plans for new addition to local mill, to be one-story, about 25,000 sq ft floor space. Machinery and facilities will be provided for increased capacity. Cost reported close to $400,000. Work on superstructure will begin soon.

Chicago, Ill.—National Biscuit Co., 7300 S. Kedzie Ave., has completed plans for new addition to local plant, to be one-story, about 60,000 sq ft floor space. Cost reported about $500,000. Contract for building has been let. Victor L. Charn, Chicago, is architect.

Chicago, Ill.—John Wood Co., 4435 S. Western Ave., water heaters and parts, has plans maturing for new addition to plant, one-story, about 80 by 320 ft, to be used for increased capacity. Cost reported in excess of $400,000. Austin Co., Chicago, is engineer and will supervise construction.

Chicago, Ill.—Verson Allsteel Press Co., 1255 E. 93rd St., stamping presses, press brakes and other metal-working equipment, has approved plans for one-story addition, 105 by 575 ft, for expansion in fabricating department. Cost reported over $1,200,000. H. G. Croll, Oak Park, Ill., is engineer. Work will proceed at once.

Peoria, Ill.—Keystone Steel & Wire Co., steel wire, wire fencing, posts, etc., has authorized an expansion and improvement program at the plant at Bartonville, a suburb of Peoria. Work will include several new one-story buildings and installation of equipment for increased output. Cost reported about $500,000, with equipment. Work will require several months for completion.

Hammond, Ind.—Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill., and Sinclair Refining Co., 600 Fifth Ave., New York, N.Y., plan joint construction of new anhydrous ammonia plant at refinery of first noted company at Hammond, with by-product hydrogen and other gases to be secured from that refinery, as well as refining plant of Sinclair company at East Chicago, Ind. Plant will consist of a number of one- and multi-story units, and is reported to cost in excess of $5,000,000. Proposed to begin work soon and to have plant ready for service early in 1956.

Burlington, Iowa—Modern Welding Co., Inc., Owensboro, Ky., gasoline storage tanks, fuel oil tanks and kindred steel products, has purchased a tract of land at Burlington, and will use for construction of new branch plant for manufacture of septic tanks, for farm service, and other steel tanks. Project will consist of several buildings. No estimate of cost announced.

Kansas City, Kan.—Colgate Palmolive Co., 14th St. and Kansas Ave., soaps, perfumery, cosmetics, etc., has approved plans for new two-story addition, 175 by 330 ft, to be used for general production, distribution and other operating service. Cost reported over $300,000. Work on superstructure will proceed at once. Albert Kahn Associated Architects & Engineers, Detroit, Mich., is architect and engineer.

Baltimore, Md.—National Gypsum Co., 2301 S. Newkirk Ave., gypsum wallboard, insulating board, plaster, etc., has authorized expansion in local plant, including several new one-story buildings and installation of equipment to increase output to about one-third. Cost reported over $600,000.

Needham, Mass.—Farrington Mfg. Co., Boston, Mass., display cases, plastic display boxes and metal containers, has arranged for construction of new plant at Needham, to be owned by Cabot, Cabot & Forbes, Inc., Boston, real estate, and occupied under long-term lease. It will be one- and two-story, about 300,000 sq ft floor space, and equipped for large increased capacity. Cost about $3,000,000. Work on superstructure is being placed under way. Burton & Vappi, Cambridge, Mass., are engineers.

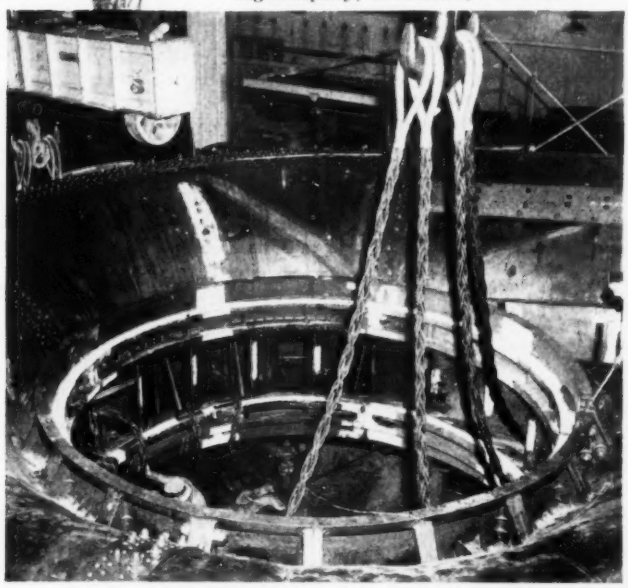
Norwood, Mass.—Mason-Neilan Regulator Co., Dorchester, Boston, Mass., regulators, valves, pump governors, etc., has completed plans and will begin work soon on new plant at Norwood, near Boston, where site has been selected. It will be one-story, equipped for large, increased output. Cost reported close to $1,000,000. Harry J. Korslund, Boston, is architect.

Springfield, Mass.—Westinghouse Electric Corp. plans expansion in local plant for production of air-conditioners and other appliances. Entire program is estimated to cost about $3,000,000, including equipment and facilities. Work will be carried out soon. J. R. Weaver is manager of manufacturing and engineering.

Detroit, Mich.—Aurora Gasoline Co. has authorized an expansion and modernization program at local oil refinery, to include construction of several new units for production of sul-

Hookers-On handle loads faster with these slings

115-ton casing assembly handled with three cranes and two pairs of Macwhyte ATLAS type 1 Round-Braided Slings.
Photo courtesy Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin



ATLAS Slings are flexible, lightweight, and easy to handle

Safety, economy, and long service life are the results of the exclusive Macwhyte ATLAS balanced-braided construction. All ropes in ATLAS Slings are braided in a continuous uniform spiral path. Ropes are endless—all ropes in the body are the same length and carry an equal share of the load. There are two pairs of Left Lay and two pairs of Right Lay ropes, making eight ropes in all in the equally balanced-braided ATLAS Sling body.

Macwhyte ATLAS braided wire rope slings last longer because they do not kink, snarl, or curl up as easily as ordinary slings.

All Macwhyte ATLAS Slings are custom-made in the size and type you need for the best load handling. In addition to ATLAS Slings, Macwhyte Company manufactures Drew Flat-Braided Slings and Monarch Single-Part Slings.

MACWHYTE SLINGS

Macwhyte engineers will recommend the proper sling for best service. For information or specifications on Macwhyte ATLAS, Drew, and Monarch Slings, ask any Macwhyte distributor or write direct to:

MACWHYTE COMPANY • *2991 Fourteenth Ave., Kenosha, Wis.*

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies.

Mill Depots: New York • Pittsburgh • Chicago • St. Paul Ft. Worth • Portland • Seattle • San Francisco • Los Angeles.

Ask for Bulletin 5308 containing load ratings, strengths and specifications

Type 1 Macwhyte ATLAS Round-Braided Sling →

For more facts circle 569 on Reply Card

NEW PLANT CONSTRUCTION

phur, petroleum cake and other petroleum byproducts. Entire project will represent a reported investment of $4,500,000 and is scheduled for completion late in 1955.

Omaha, Neb.—Central Fiber Products Co., Inc., Omaha, paperboard products and fiber specialties, will begin work soon on new converting plant on local site at 10th and Missouri Sts. It will be one-story, approximating 240,000 sq ft floor space. Cost reported close to $1,000,000, with equipment. Cecil A. Martin & Associates, Omaha, are architects.

Fieldsboro, N.J.—Filtered Resin Products, Inc., Baxley, Ga., gum and wood fillers, special resin products for building service, etc., has purchased tract of about 14 acres of land at Fieldsboro, and will use as site for new branch plant. Plans under way for several one-story buildings. No official estimate of cost announced — reported over $140,000.

Cadyville, N.Y.—Jewel Mfg. Co., Albany, N.Y., dinettes and other furniture products, has plans for new two-story plant, about 200 by 200 ft, at Cadyville, where site has been selected. Cost reported approximately $100,000, with machinery and facilities.

Durham, N.C.—Central Carolina Farmers Exchange, Inc., Durham, animal feed, commercial fertilizers, etc., has plans for new one-story plant on local site, to be equipped for poultry processing and preparation. Cost reported close to $175,000, with equipment. Erection contract will be let soon. G. F. Hackney, Durham, is architect.

Ashland, Ohio—General Latex & Chemical Corp., Cambridge, Mass., synthetic rubber latex and resin compounds, has approved plans for new plant at Ashland, on which work will proceed at once. It will be one-story, totaling about 30,000 sq ft floor space, and reported to cost about $300,000. Proposed to have plant ready for service in spring of 1955.

Ashtabula, Ohio—Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York, N.Y., is projecting plans for new plant for production of titanium, at Ashtabula, in vicinity of present metallurgical plant. It will comprise several large units, equipped for an annual rating of about 7500 tons of titanium, and is reported to cost approximately $31,000,000. Proposed to have plant ready for service early in 1956.

Fremont, Ohio—Crown Rubber Co., stair treads, rubber mats and other composition rubber products, plans new one-story addition to plant on adjoining site, with installation of processing and other equipment for increased capacity. Cost reported about $200,000.

Midland, Ohio — Rem-Cru Titanium, Inc., Midland, titanium metal, has closed agreement with the Government for large expansion in local plant, to increase present capacity of 2500 tons to 11,150 tons per annum. Work will consist of a number of new buildings and installation of equipment, and will require about 24 months for completion. Cost $12,775,000, with financing arranged through Government.

Port Clinton, Ohio—Celotex Corp., Chicago, Ill., cane fiber insulation board, asphalt roofing and kindred products, has authorized expansion in branch plant at Port Clinton, consisting of a group of eight one-story buildings, totaling over 120,000 sq ft floor space. Machinery and facilities will be installed for large, increased output. Cost reported in excess of $2,500,000.

Bellefonte, Pa.—Titan Metal Mfg. Co., aluminum, brass and other metal forgings, castings, die stampings, etc., will carry out a large expansion and modernization program at local plant. Work will include a new one-story addition, about 14,000 sq ft floor space, and certain alterations and improvements in present buildings. New equipment will be installed for considerably increased output. Entire project will represent a reported investment of about $750,000, and will require several months for completion.

Final Jones and Laughlin Junior Beam is set in place for new plant of Marvel-Schebler Prod. Div., Borg-Warner Corp.

Connelsville, Pa.—Baltimore & Ohio Railroad Co., Baltimore, Md., has plans for new car repair shop at company terminal at Connellsville. It will consist of a main one-story building and several smaller units. Machinery and facilities will be installed for railroad car repair and maintenance. Cost reported about $1,500,000. Work will be carried out over a period of months.

Ellwood City, Pa.—Townsend Co., New Brighton, Pa., rivets, studs, wire nails, etc., has plans maturing for new one-story plant, about 50 by 540 ft, at Ellwood City, where site has been selected. Cost reported in excess of $750,000, including equipment. Proposed to begin work soon. Joseph F. Vontempo, Rochester, Pa., is architect.

Charleston, S.C.—Claussen Baking Co., 215 St. Philip St., bread, cake, biscuits and other bakery products, has plans maturing for new one-story baking plant on local site, to be equipped for heavy daily output. Cost reported about $1,200,000. Proposed to begin work before close of this year.

Liberty, S.C.—Alexander Smith, Inc., Yonkers, N.Y., rugs and carpets, has purchased large industrial plant at Liberty, about 52,000 sq ft floor space, and will equip at once for new mill. A consideration of $597,600 was given for property. Plans have been approved for immediate construction of addition to mill, about 38,000 sq ft floor space, providing a total of 90,000 sq ft floor area. Cost reported over $400,000 in excess of amount noted.

Taylors, S.C.—Southern Bleachery & Print Works, Inc., bleaching, dyeing, printing, etc., of textile products, has appproved plans for expansion in mill, including new production units and installation of equipment for large increased capacity. Cost reported over $1,500,000. Work will proceed at early date and require a number of months for completion. Robert & Co. Associates, Atlanta, Ga., is architect and engineer.

Nashville, Tenn.—America & Southern Corp., 1000 Sixth Ave., S., gas and electric water heaters, rangers, ovens and other appliances, has plans for new plant on local site on Andrews Blvd., near Thompson Lane, to be one-story, equipped for considerable increase in present capacity. Cost reported about $300,000. Proposed to begin work soon.

Athens, Tex.—Olive & Myers Mfg. Co., Dallas, Tex., household furniture, has plans under way for new three-story plant on local site, about 650,000 sq ft floor space. Cost reported over $1,000,000, with machinery and facilities. Proposed to begin work before close of year. Giffels & Vallet, Inc., Houston, Tex., are architects and engineers.

Port Arthur, Tex.—Gulf Oil Corp., refined petroleum products, gasoline, etc., has plans for new oil packaging and canning plant in vicinity of local oil refinery, consisting of several one-story structures, equipped for heavy output. Cost reported close to $2,000,000. H. K. Ferguson Co., Houston, Tex., is engineer-contractor.

Waynesboro, Va.—Dawbarn Bros., Inc., plastic products, has approved plans for new plant on local site. It will be one-story, about 75,000 sq ft floor space, estimated to cost over $450,000, with processing and other equipment. Work on superstructure will proceed at early date.

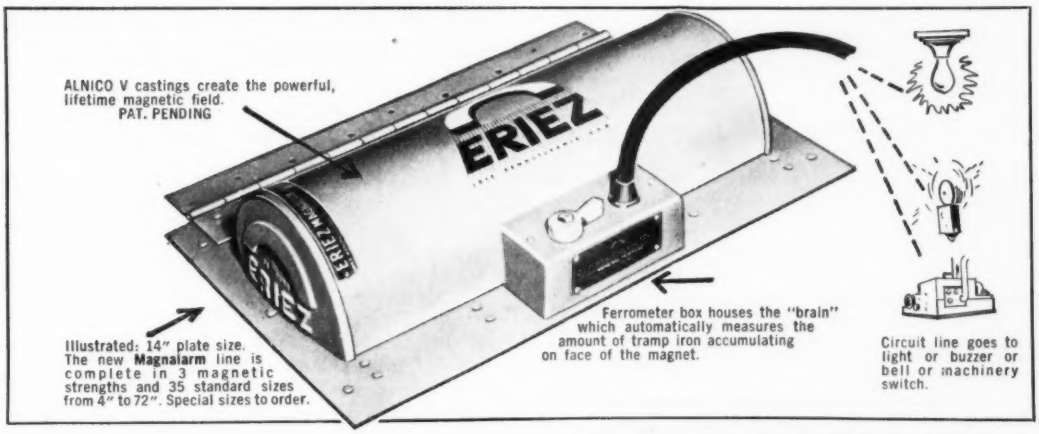
The only magnetic separator that tells you when your magnet needs cleaning:

it's the new MAGNALARM

Magnalarm, the revolutionary Eriez invention with a ferrometer "brain", signals you *automatically* when the magnetic separator has collected a preset amount of tramp iron! Maximum efficiency is the result!

Tramp iron that used to "get by" due to overloaded and uncleaned separators is ended with a *Magnalarm*. Such "extra" tramp iron could cause "extra" machinery damage, fires, product contamination.

Now *Magnalarm* signals you when the magnet plate needs cleaning. A light goes on . . . or a bell sounds . . . or the machinery line is shut down automatically. You are *always* guarded against costly tramp iron dangers with *Magnalarm*.


ALNICO V castings create the powerful, lifetime magnetic field. PAT. PENDING
ERIEZ
Illustrated: 14" plate size. The new **Magnalarm** line is complete in 3 magnetic strengths and 35 standard sizes from 4" to 72". Special sizes to order.
Ferrometer box houses the "brain" which automatically measures the amount of tramp iron accumulating on face of the magnet.
Circuit line goes to light or buzzer or bell or machinery switch.

HOW DOES IT WORK?

Magnalarm's "brain" is a ferrometer which measures the actual magnetic loading. When the amount of tramp iron across the entire face of the magnet reaches the predetermined Danger Point (which is where magnetic effectiveness is temporarily reduced to minimum operating efficiency), the "brain" *acts!* A circuit is opened or closed depending on the action you require. Open circuits are used to ring a bell or buzzer or turn on a light. Closed circuits are used to shut down your line of machinery. The signaling action continues until the *Magnalarm* has been cleaned of its dangerous tramp iron load. The only electric current required is that used to open or close the circuit. *Magnalarm* is in itself the same powerful, non-electric, permanent magnetic separator which won Eriez the position of being the world's largest manufacturer of permanent magnets!

MAGNALARM "SAVINGS"

1. Trouble-saver by giving you the maximum protection against fires, machinery damage and product contamination.

2. Time-saver in eliminating the need of checking separators in remote and hard-to-get-to places.

3. Money-saver in eliminating the need of shutting down machinery while separators are checked.

4. Reputation-saver by guarding quality . . . telling you when and how much contamination you are getting in your line.

CARBORUNDUM COMPANY FINDS MAGNALARM THE ANSWER TO DIFFICULT PROBLEM

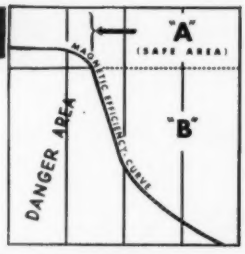
Carborundum Company of Niagara Falls, N. Y. had a serious problem with tramp iron which was causing heavy machinery damage to a rice coal pulverizer. Because an installation of magnetic separators would necessarily have to be in a place difficult and awkward to inspect, the maintenance of an ordinary magnetic separator created its own special problem. Accumulations of tramp iron on the magnet could readily become excessive even with periodic inspections and the cost of damage caused by tramp iron which "might get by" would result in labor and replacement parts expense.

However, Carborundum Company found the new Eriez *Magnalarm* the perfect answer to its trouble. Inspection and cleaning of the magnetic separator is only necessary now when *Magnalarm* signals that a predetermined amount of tramp iron has been caught. So important to the company's equipment is the *Magnalarm* that Carborundum employs the signaling device which automatically shuts down the line the instant the alarm is tripped.

COST, INSTALLATION AND MAINTENANCE

The cost of *Magnalarm* is only pennies more than regular magnetic separators. Installation is simple. Easy-to-follow instructions come with each unit. *Magnalarms* are preset at the Eriez factory but you can increase or decrease your *Magnalarm's* sensitivity by a simple adjustment.

MAGNETIC EFFICIENCY AS GOVERNED BY TRAMP IRON ACCUMULATION



"Magnalarm's" signaling action makes sure you operate only in the strong, safe range marked "A." Strength of ordinary magnets will be lowered by tramp iron accumulation to the inefficient operating danger area marked "B" unless checked and cleaned frequently.

WRITE FOR EXCITING, FULL DETAILS

on Magnalarm, the only magnetic separator of its kind!

Fill out the easy coupon below. Do it yourself . . . or do it for someone within your organization who will be grateful for the complete "Magnalarm" story. Sizes. Magnetic strengths. Types of installation. Construction. Electrical circuits. Types of ferrometer element. Special features. Even how to order. It's all there.

ERIEZ

Eriez Manufacturing Company
71-L Magnet Drive, Erie, Pa.

ERIEZ

Send me the "MAGNALARM" literature

Name _____

Address _____

City _____ State _____

Company _____ Title _____

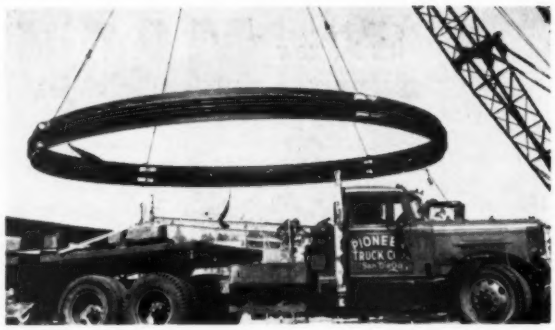
For more facts circle 570 on Reply Card

Giant Bellows Built to Allow Aeronautical Wind Tunnel "Stretch"

HUGE STAINLESS STEEL expansion joints installed in a National Advisory Committee for Aeronautics wind tunnel in Cleveland allow the tunnel to "give" under the stress of air pressure or heat. A total of 13 expansion joints were built by Solar Aircraft Co., San Diego, for this project, ranging in size from 5 ft to 28 ft in diameter. The 28-ft assembly is the largest metal bellows ever manufactured.

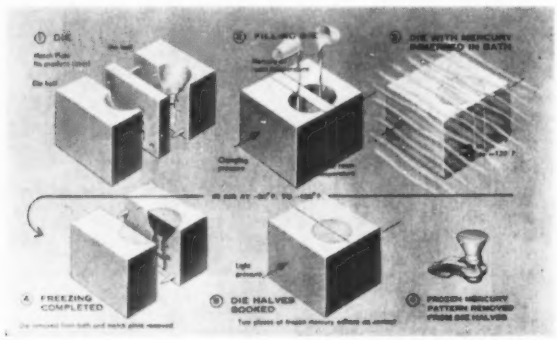
Special forming and welding techniques were used in fabricating the bellows, which consist of stainless steel convolutions—to allow expansion and contraction when built into the wind tunnel—joined to carbon steel pipe ends.

In addition to wind tunnel applications, the joints are used where temperature, pressure or corrosion are prob'ems.



"Booking" Operation Extends Possibilities of Frozen Mercury Casting

DESIGN OF PARTS possessing far greater complexities is now possible through the frozen mercury process of investment casting, because of a feature known as "booking." This feature permits two or more pieces of frozen mercury to be joined with only slight pressure on individual parts.



Complex patterns, with interior coring and gating so intricate as to make them impractical or impossible by other methods, can be easily and economically produced by the frozen mercury process of the Mercast Corp., New York.

The original die may be made in two identical halves, separated by a match-plate that is perfectly smooth on both sides. The two halves are linked with dowel pins extending through the match-plate.

Liquid mercury is poured into the two die halves, and the entire assembly is placed in a freezing bath. When the material is frozen, the die is opened and the match-plate removed. The two sides of the die, aligned by dowels, are placed together, bringing the opposing smooth surfaces of the two halves of the pattern into contact.

When the halves are touching, pressure or tapping on the die will cause the mercury to unite, welding the two ha'ves.

Booking is not limited to the joining of two frozen sections only; patterns have been made with as many as twelve separate booking operations.

Plastic Molding Development Helps Engineers Study Metal Casting Processes

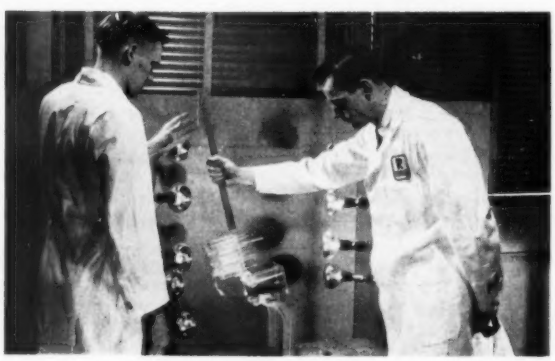
AN ECONOMICAL METHOD for producing transparent models for use in study of fluid flow as a part of foundry research has been developed at the General Motors Research Laboratories.

The development makes possible economical production of a transparent model of an investment mold containing irregularly shaped internal cavities such as are used in casting buckets for jet turbine type engines.

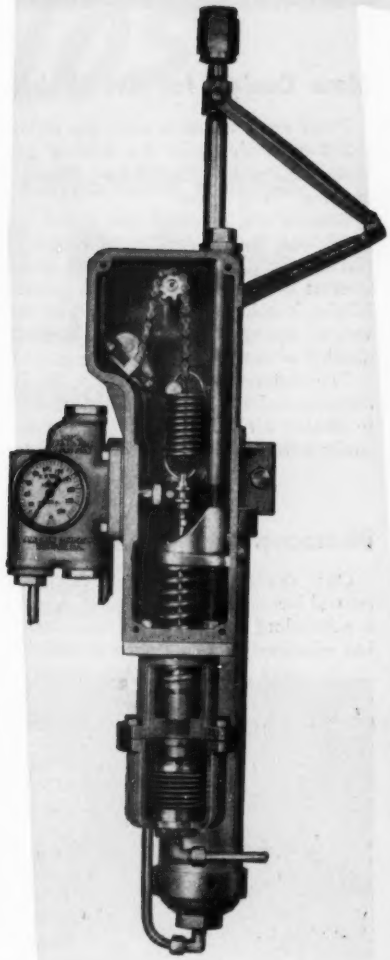
A pattern for the required part is made of an alloy with an extremely low melting point. A liquid, cold-pouring, thermosetting plastic is then poured around the metal pattern.

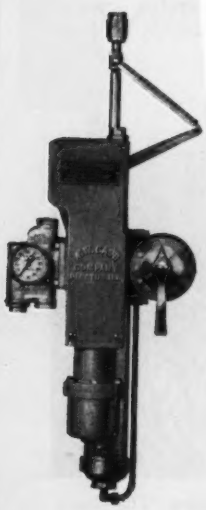
When the plastic has set, it is heated until the metal pattern melts and drains out. After the last traces of metal are cleaned out with acids, the mold is transparent and ready for use in flow studies. The transparent mold models are used in the examination of fluid flow for the study of gating systems. High speed motion picture cameras capable of slowing the action down to one-sixteenth of normal speed, photograph the action of water as it flows through the mold in a simulated casting operation.

The high speed pictures disclose such things as turbulence in the fluid, entrapped air and uneven distribution of fluid in poorly designed mold arrangements.



Research Laboratories metallurgists concluded that while any mold system can be finally evaluated only by actual metal casting, fluid flow studies in transparent mold models can be a helpful tool in pointing the way to vast improvement of casting quality.





The CASH STANDARD 100 Series Automatic Controllers will position levers, electrical controls, valves and other processing equipment to the most exacting degree of accuracy.

CASH STANDARD

P. O. BOX 551, DECATUR, ILLINOIS

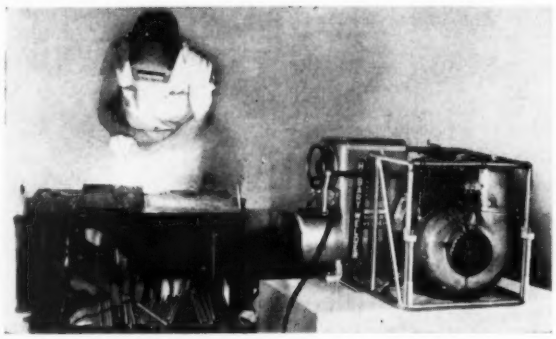
For more facts circle 571 on Reply Card

New Design for Arc Welder Uses Gas Turbine for Prime Mover

FIRST ARC WELDER to use a gas turbine as a prime mover, a 250-ampere capacity d-c welding generator has recently been developed by the Hobart Brothers scientific research division, Troy, Ohio.

Successfully operated and tested under actual working conditions, the turbine-driven welder is not yet a commercial development, but is intended to further the company's interest in knowledge about the gas turbine and the possibilities it holds for use in building more compact, lighter weight equipment. Greatly reduced weight and size are decided advantages of using the gas turbine.

The turbine type power may be the answer to lighter airborne welding equipment, that could be easily transported in smaller aircraft than the present cargo plane, and more easily moved about a plant for maintenance work.



Photocopying Proves Important in Aircraft Production Scheduling System

ONE ANSWER TO THE COMPLEX PROBLEM of production control has been found at North American Aviation, where a scheduling program has been instituted. The program has effectively decentralized production control to fix responsibility in the individual departments. The result has been a smooth functioning flow of production with a minimum amount of lost production time.

Heart of the system is a carefully controlled schedule with a nearly foolproof method of conveying data on production status from department to department. The responsibility for notification on such things as production delays, parts shortages and work order changes has been switched from departments "downstream" in the production flow to those "upstream."

Key to the system is the use of 23 photographic copying machines spotted throughout the plants. Furnished by American Photocopy Equipment Co., Chicago, the units are continuous copiers and automatic processing units combined into one compact machine, and located in orange canopied booths for ready recognition. Production forms are processed here, following production flow.

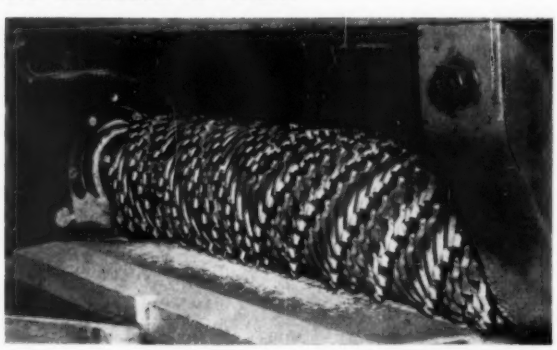
Every production order is originally produced on ditto machines, on all copies of the order set. Information on these preprinted order forms includes: Part number, index number, date released, description of part, department, contract and account number, quantity, operation or material used, tool type and number, speed, feed and set up time.

Cutting Industry's Most Abrasive Plastic Puts Carbides to Work

CARBIDE MILLING CUTTERS are outlasting steel approximately 35 to 1 on one of the most abrasive plastics used by industry in the Switchgear Department of General Electric in Philadelphia.

Approximately 115 pieces of plastic (composed of 60 per cent zircon sand, 30 per cent asbestos, 5 per cent talcum and 5 per cent phosphoric acid) used on switchgear arc chutes are run through the milling machine before the Carboloy carbide tips require maintenance. Two pieces was the limit with steel cutters.

Two milling machines are used in the operation. Both are equipped with Carboloy grade 905 carbide. The first, with 198 cutters, cuts 50 slots, 1¼ in. deep and ⅜ in. wide. The second, with 300 cutters, cuts 100 slots ¼ in. deep and 3/32 in. wide.



The carbide teeth are set with a 10 degree radial rake angle. They have a 4 deg primary clearance, 7½ deg secondary clearance and a 3 deg side clearance. The plastic is fed at 19 in. per minute, and the cutters turn at 126 rpm.

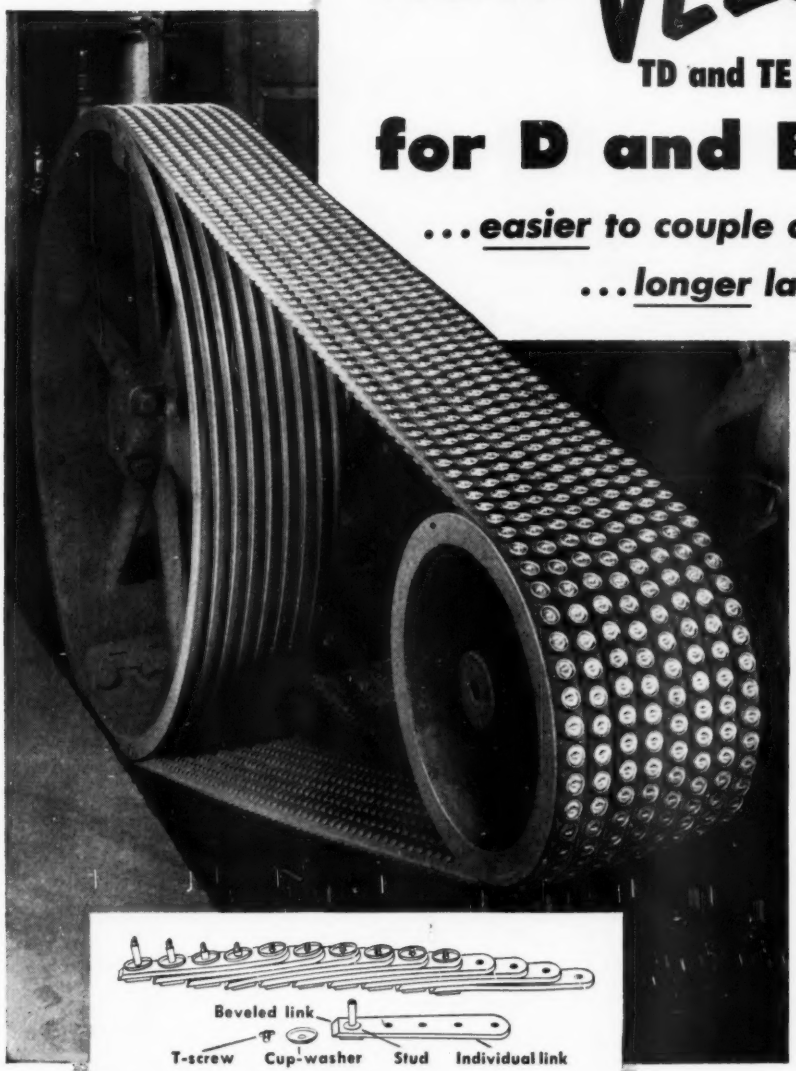
NEW VEELOS

TD and TE Adjustable V-belts

for D and E Drives

...easier to couple and uncouple

...longer lasting



This detailed line drawing of the new Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job... easier!

Now get the v-belt that's been especially developed for D and E drives—the new, patented Veelos TD and TE adjustable v-belt!

This new Veelos has advantages unmatched by any other v-belt. It is *installed quickly* without removing the outboard bearings found on most D and E drives. It is the easiest v-belt to couple and uncouple ever developed. Cup-washers and T-screws join links together to form individual belts of any length. Veelos TD and TE *lasts longer* because new high-tensile strength links plus the new stud, cup-washer and T-screw design give *added strength* —combines this added strength with *maximum flexibility* for cooler, smoother running.

Install this new Veelos TD and TE v-belt on your D and E drives. Prove to yourself why there's no v-belt that can match the performance, the efficiency and the economy of Veelos TD and TE.

Get the complete story of this great new v-belt for D and E drives. Send the coupon now for new 8-page illustrated catalog.

VEELOS
THE LINK
V-BELT

Veelos is known as Veelink outside the United States.

MANHEIM MANUFACTURING & BELTING CO.
652 Manbel St., Manheim, Pa.

Please send copy of your new Veelos TD and TE v-belt catalog.

Name .....

Company .....

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.....

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

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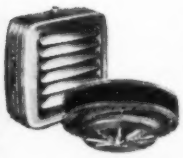
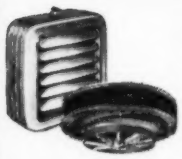
YOU name the heating job . . .

STEAM



Modine builds 13 sizes of vertical delivery units with choice of 5 easily attached optional deflectors. Horizontals in 19 standard and low-outlet temperature models.

HOT WATER



Your choice of 13 vertical delivery units with 5 easily attached deflectors. Five sizes of horizontal models, designed specifically for hot water.

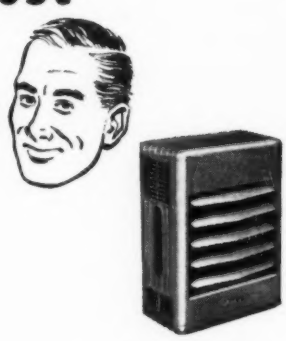
GAS

Only Modine gas-fired units have stainless steel burners and a choice of stainless or aluminized steel heat exchangers. Seven sizes — 25,000 to 220,000 Btu.

Modine offers the unit heater to do it better . . . at lower cost

Compare Modine steam and hot water units with all other makes

For over 25 years, Modine has paced the field in unit heating. Every model provides perfect heating comfort plus lowest possible fuel cost. This balanced heating is the result of the discharge temperatures of 110 to 120° F being correctly related to heat throw and air volume. For the complete story, see the Modine representative listed in your classified telephone directory, or write today for Bulletin 154.



Modine gas-fired unit heaters cost less to install, less to operate

In addition to greatly extended life, Modine Gas-Fired Unit Heaters cost less to install. That's because they're only half the weight, half the size of other leading units. And this lighter weight—coupled with direct firing of tubes and reduction of heat exchanger mass—gives you heat within 5 seconds of thermostat's call. Write for Bulletin 654. Modine Mfg. Co., 1563 DeKoven Avenue, Racine, Wisconsin.

U-1247

Modine UNIT HEATERS

For more facts circle 573 on Reply Card

"...now—I can handle light or heavy loads easier, smoother and with greater accuracy."

It's true . . . any crane operator can do a more efficient job with Whiting's new magnetic Selectodyne hoist control. Having eleven instead of the conventional five speed selection points, Selectodyne permits precision handling of any load . . . light *or* heavy. Selectodyne provides *easier*, *smoother* load handling at speeds that assure the utmost in safe, sure crane control. Simple in design, trouble-free in operation, Selectodyne is another reason why Whiting Engineered Cranes perform better at lower cost!

WHITING CORPORATION
15675 Lathrop Ave., Harvey, Illinois

New Selectodyne Folder

Gives complete information on the advantages of this remarkable new control. Write for your copy today!

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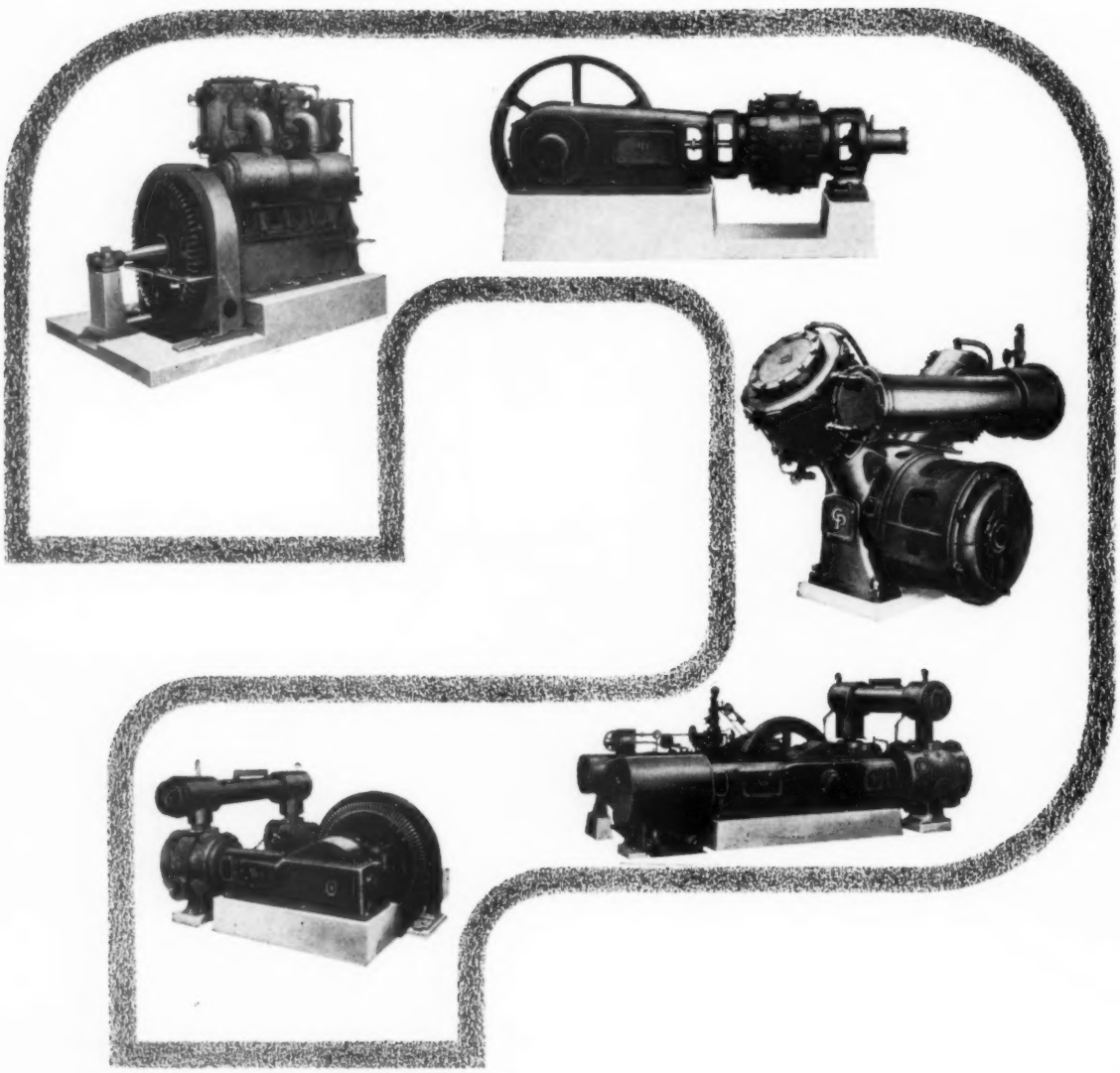


WHAT DO YOU WANT IN A COMPRESSOR?

Whatever your requirements, there's a CP Compressor to fulfill your air needs at minimum operating and maintenance costs. Whether the type is portable or stationary . . . single-stage or multi-stage . . . lubricated or oil-less cylinder . . . vertical or horizontal . . . air-cooled or water-cooled . . . for air or gas compression, you can select from Chicago Pneumatic's wide line of compressors. Capacities range from 60 to 10,000 cfm., 7½ to 2000 hp. For complete information on the type compressor you have in mind, write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For more facts circle 575 on Reply Card

Not if you use <u>new</u>, disposable KIMWIPES!

Don't let expensive cloth and waste wipers rob you of profits. Replace them with Type 1300 KIMWIPES—the *modern* industrial wipers that give you four to ten times more wiper area per dollar!

Yes, and new Kimwipes 1300 are soft, strong and absorbent. A full 12" x 18" in size, they hold up to 8 times their own weight in liquids. They're non-abrasive, too. There's no holdover of metal chips or other infectious material that may cause dermatitis and loss of man hours. Type 1300 Kimwipes are absolutely clean to start with, and are disposed of after use. Ask your salesman for samples. And remember, you can also buy Type 900-S Kimwipes (optical wipers) and Type 900-L Kimwipes (regular wipers). Save money. Order today!

Kimberly Clark
INDUSTRIAL WIPERS
Kimwipes

Kimberly-Clark Corporation • Neenah, Wisconsin

For more facts circle 576 on Reply Card

Presto... it's UP!

17 ft. "UP-RIGHT" SCAFFOLD-ON-WHEELS set up in only 3 minutes!

As if by magic, an aluminum alloy tower of any height desired is ready in minutes! Individual scaffold sections are set one on top of the other. Sections lock into place instantly.

"Paid for itself in labor savings on first job . . . and now we use UP-RIGHT Scaffolds on all our overhead maintenance",

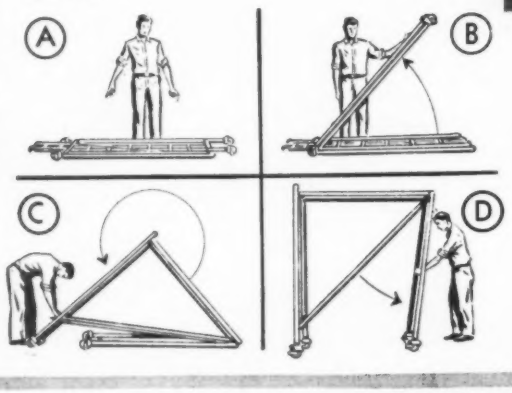
says R. W. Hiller, Plant Engineer Engineering Works Div. Dravo Corp., Pittsburgh

HERE'S THE SECRET!...

PATENTED

ONE-PIECE SECTIONS

Each one-piece section is unfolded by one man in less than a minute! No tools, wing nuts or bolts.



Your maintenance costs can be reduced by "UP-RIGHT" SCAFFOLDS

WRITE FOR DESCRIPTIVE CIRCULAR

"UP-RIGHT" SCAFFOLDS

DEPT. 140 • 1013 PARDEE ST. • BERKELEY, CAL.

Factories: Berkeley, Calif. & Teterboro, N. J.

Offices in all principal cities

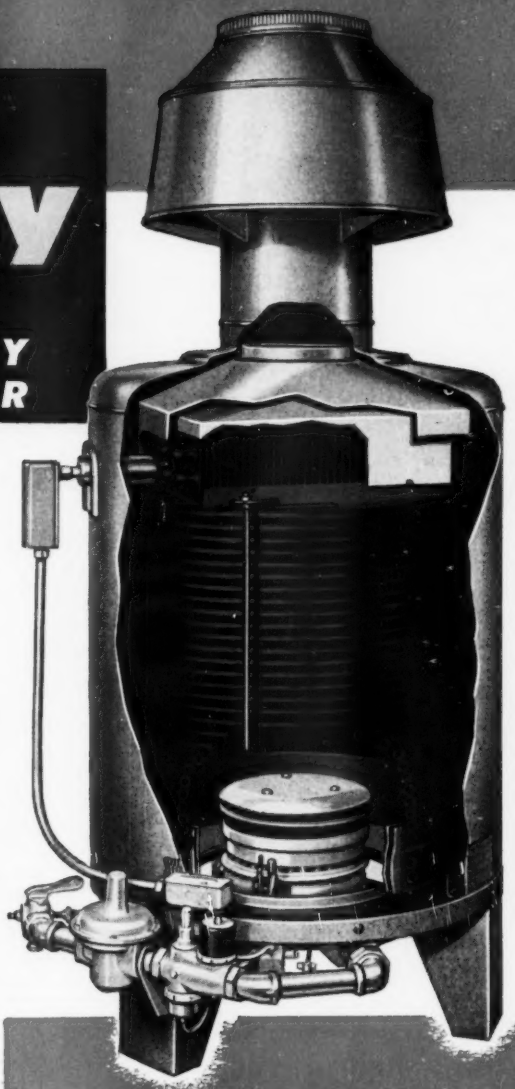
For more facts circle 577 on Reply Card

Reduce HOT WATER *Generation Costs* . . .

with the new

A.O.Smith Burkay "718"

HIGH RECOVERY WATER HEATER



Significant cost reduction in the heating of hot water for many plant needs can be made with the A. O. Smith Burkay System of Water Heating. A new addition to this famous line is the "718"—the water heater with "big job" capacity: 403 gallons per hour at 100-degree temperature rise, with an input rating of 420,000 BTU per hour!

By installing a "718" you can cut back the operation of your expensive boilers, reduce the size of your boilers; or in some cases dispense with them entirely . . . thereby reducing overhead, labor and maintenance costs. Furthermore, the large capacity of the "718" reduces the need for multiple heater connections.

For the plant restaurant, the Burkay "718" with the A. O. Smith patented Booster-Recovery System provides water at two temperatures simultaneously: 140 degrees for general-purpose needs and all of the 180-degree sanitizing rinse required by health authorities for the rinsing of dishes.

Packed with exclusive A. O. Smith design features that provide: all copper construction for clean, rust-free water; full combustion efficiency; accurately controlled water temperatures; instant response to hot water needs—this high recovery unit gives you *more hot water* at the *right temperature* for *less money* in *less time!*

Call the nearest A. O. Smith distributor for the full details; or write for Model "718" Specification Sheet.

"Plenty of Hot Water Pays All Ways"

Through research A.O.Smith *. . . a better way*

A.O.Smith CORPORATION

PERMAGLAS DIVISION • KANKAKEE, ILLINOIS

WRITE FOR COMPLETE INFORMATION ABOUT THE "718," TODAY

A. O. SMITH CORPORATION
Permaglas Division, Kankakee, Illinois, PE-11-54
Gentlemen: Please send me immediately full details on the "718."

Name.....Title.....

Company.....

Address.....

City.....Zone....State.....

For more facts circle 578 on Reply Card

MICRO SWITCH Precision Switches

A PRINCIPLE OF GOOD DESIGN

Here are 258 precision switches to improve your plant equipment

• This new MICRO SWITCH Catalog 101 is packed with information on precision switches to make your present plant equipment more automatic, safer and more productive.

Whatever your equipment, whatever the conditions in which it operates, there is a MICRO SWITCH precision switch designed to make it work better. Catalog 101 and a visit to your nearest MICRO SWITCH distributor will give you a clear picture of the wide variety of precision switches MICRO SWITCH has to offer.

In the MICRO SWITCH line there are hundreds of switches that are not only readily adaptable to complex installations but give dependable service throughout a long trouble-free life.

Look under "Switches, Electric" in the yellow pages of your phone book for the name of your MICRO SWITCH distributor. Ask him to send you Catalog 101 today.

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

FREEPORT, ILLINOIS

H HONEYWELL

For more facts circle 579 on Reply Card

"Poor Ted! No more splinters for the nurse to pull out since we have bench tops of

MASONITE TEMPERED PRESDWOOD"

all through the plant...

MASONITE PRESDWOOD

solves maintenance problems!

It's a fact! Bench tops, table tops and other work surfaces of Masonite Tempered Presdwood are safer! No slivers, no splinters, no jagged edges!

This grainless, all-wood hardboard presents other advantages, too. Its flat, smooth surface won't injure even highly polished parts. It takes a lot of punishment. And it comes in types and thicknesses for practically every need.

Send for our free booklet that shows many other ways how sturdy, economical Masonite Presdwood® products ease maintenance worries. Your building materials dealer is the man to see for this versatile material.

PRESDWOOD
WOOD MADE BETTER

NATURALLY STRONGER WITH LIGNIN

MASONITE® CORPORATION

Dept. PE-11, Box 777, Chicago 90, Ill.

Please send me your brochure on "How to Improve Factory Methods with Masonite Presdwood."

Name.....

Firm.....

Street.....

City.....*Zone*.....

County.....*State*.....

"Masonite" signifies that Masonite Corporation is the source of the product

For more facts circle 580 on Reply Card

WEIGHS 28 LB

LIFTS 1,000!

KELLER AIR HOISTS

Lightness in weight is an advantage you get when you LIFT WITH AIR. One man easily carries a Keller Air Hoist up a ladder and hangs it . . . thus it is easy to move from place to place in the shop, and to service.

POSITIVE CONTROL OF THE LOAD—The Keller Air Hoist operates with an air valve, so it has an infinite number of speeds from the merest "nudge" to 17 fpm. Spotting is easy and accurate with the positive displacement motor and mechanical brake that locks the load in place.

LOWER MAINTENANCE COSTS—An air motor cannot burn out—from overload, stalling, continuous use, or too frequent reversals. Thus the use of air hoists usually brings a substantial reduction in down time and expense.

Available in 3 capacities—300, 1,000, and 2,000 lb. For full information, ask for Catalog Section 86.

KELLER TOOL COMPANY

1327 Fulton St., Grand Haven, Mich.

For more facts circle 581 on Reply Card

Parlon Stays On!

From Pearl Harbor to the Statue of Liberty

SCHOOLROOM FOR SUBMARINERS—Filled with 20 fathoms of water—that's a depth of 120-feet to landlubbers—this tower at Pearl Harbor is used to teach Navy men to escape from underwater. The inside has to be protected by a coating that can withstand continuous submergence, provide good visibility, yet won't rust, won't peel, won't require frequent shutdowns for repainting. For the job, the Navy selected Torex Enamel, a Parlon-based paint made by Inertol Co., Inc., Newark, N. J., and 27 S. Park, San Francisco.

BRIGHT WELCOME—Bedloe's Island, home of the Statue of Liberty, must always look its best. To keep it that way, Ramuc Masonry Paint, another Inertol Parlon-based product, is used on the administration building and employees' quarters. Despite continual exposure to sea air and moisture, Ramuc has succeeded where previous finishes failed.

From Pearl Harbor to the Statue of Liberty—and all stops between—Parlon-based paints are providing better service at lower long-term cost. That's because in any climate, and under the most adverse conditions, Parlon-based paints can be counted on to stand-up. Despite blistering sun or sub-zero cold, salt sea air or corrosive fumes, paints made with Hercules Parlon (chlorinated rubber) have what it takes to keep structures bright and clean.

For interior or exterior work, for masonry, metal or wood surfaces—there's a Parlon-based paint ideally suited for every maintenance job. For details on Parlon-based paints and case histories of their use, see your dealer or write directly to Hercules—the producer of Parlon.

Cellulose Products Department **HERCULES POWDER COMPANY** *966 Market St., Wilmington 99, Del.*

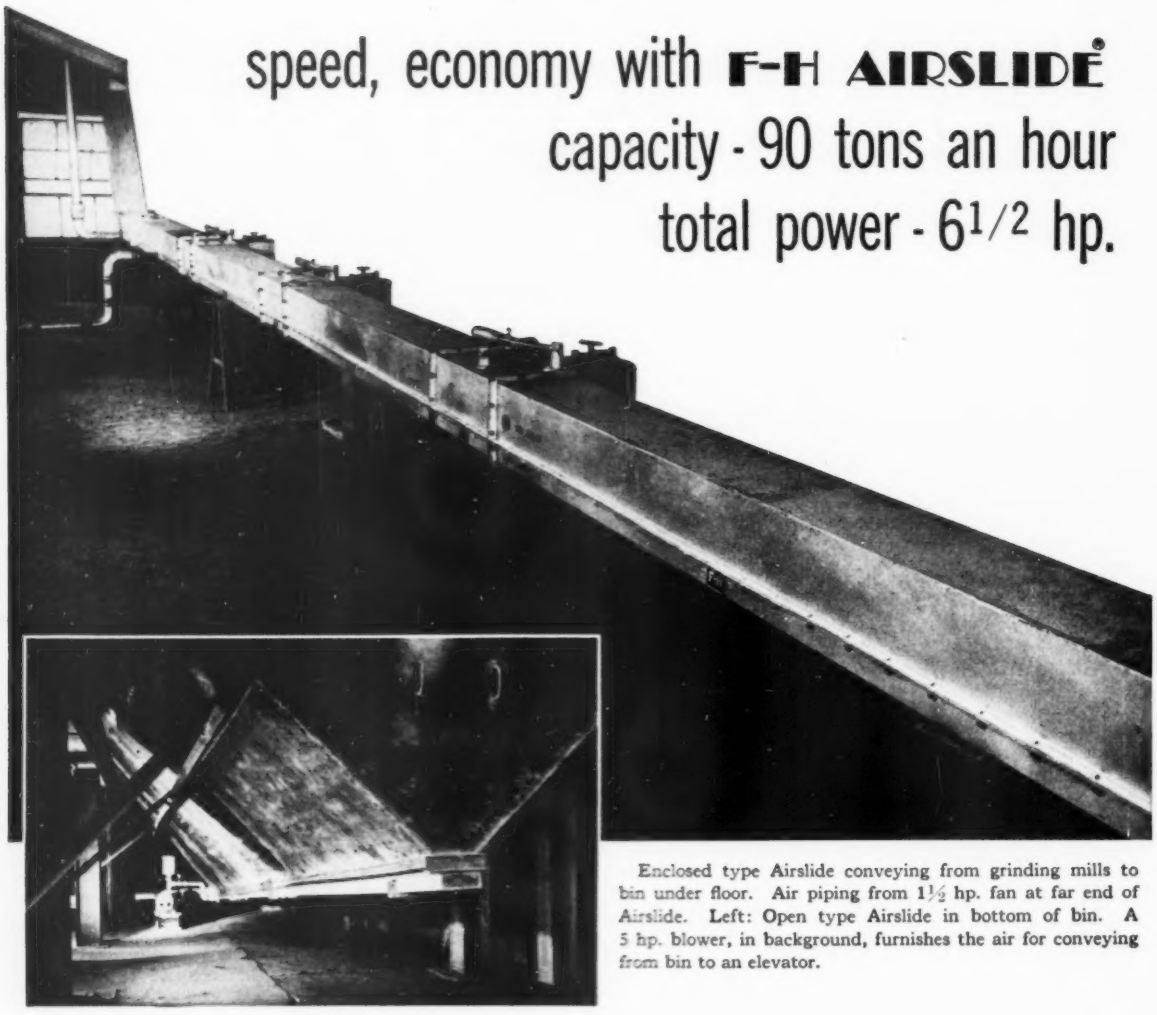
LOOK FOR THIS LABEL ON THE PAINT CAN...

MADE WITH **Parlon®** HERCULES® CHLORINATED RUBBER

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 430 MANUFACTURERS UNDER THEIR OWN BRAND NAMES ....

For more facts circle 582 on Reply Card

speed, economy with F-H AIRSLIDE®
capacity - 90 tons an hour
total power - 6 1/2 hp.



Enclosed type Airslide conveying from grinding mills to bin under floor. Air piping from 1½ hp. fan at far end of Airslide. Left: Open type Airslide in bottom of bin. A 5 hp. blower, in background, furnishes the air for conveying from bin to an elevator.

Again, the F-H Airslide Conveyor has proved to be the best way to move dry, pulverized material. The installation illustrated, like many others, has cut handling costs. Hazards to workmen have been eliminated. Power costs are negligible. There are no breakdowns and costly repairs. Material, aerated to flow like a fluid, travels from grinding mills to bin, from bin to elevator, at rate of 90 tons an hour. Power requirements? One blower and one fan: total 6½ horsepower.

Side discharge valves installed in the Airslide above the bin may be set, either to direct entire material flow through one spout, or divert any portion of the material stream to obtain a desired distribution and mix in the bin below the floor.

If your conveying costs are cutting into profits, consult a Fuller engineer. He will be glad to study your problem and submit recommendations, without any obligation.

Fuller
CONVEYS BY AIR
...NOTHING MOVES BUT THE MATERIAL

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS · COMPRESSORS AND VACUUM PUMPS · FEEDERS AND ASSOCIATED EQUIPMENT

For more facts circle 583 on Reply Card

FULLER COMPANY, Catasauqua, Pa.
Chicago 3 · 120 S. LaSalle St.
San Francisco 4 · 564 Market St.
Los Angeles 36 · 5225 Wilshire Blvd.
Seattle 9 · 120 6th Ave. N.
Birmingham 3 · 2000 1st Ave.

FH-37
1963

For more facts circle 584 on Reply Card——→

Twin Staynew

LIQUID FILTERS *on the job in Gustin-Bacon Manufacturing Company's Kansas Plant*

Treated water used to cool transformers, busbars, bushings, and bushing terminals in the Gustin-Bacon Manufacturing Company's plant at Kansas City must be kept free of all foreign matter to insure uninterrupted around-the-clock operation.

Since the installation of these giant bronze fitted ELS Liquid Filters in the circulating cooling water system, down time due to cooling tube and orifice stoppage has been eliminated.

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER
CORPORATION
55 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

YOU NEED A STAND-BY

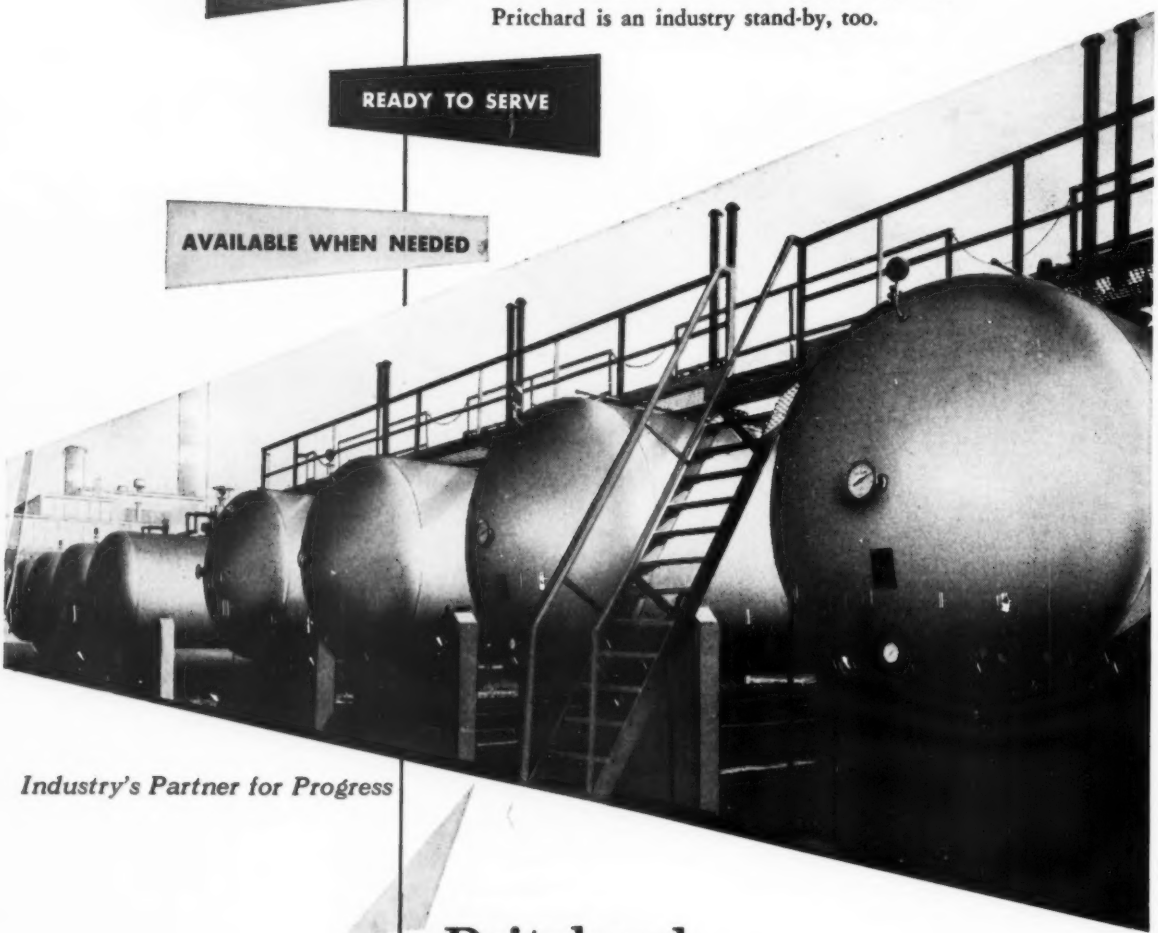
That's why Ford Motor Company has this line-up of propane storage tanks standing by at their Cleveland plant. Ford wanted an *assured* fuel supply at all times.

And why did Ford choose Pritchard to build its complete propane-air stand-by installation? Simply because the exceptional experience and abilities of Pritchard engineering and construction specialists has been proved on dozens and dozens of similar jobs. You see, Pritchard is an industry stand-by, too.

DEPENDABLE

READY TO SERVE

AVAILABLE WHEN NEEDED



Industry's Partner for Progress

J.F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS

Dept. 397 210 West 10th Street, Kansas City 5, Mo.

CHICAGO • HOUSTON • NEW YORK • PITTSBURGH • ST. LOUIS • TULSA

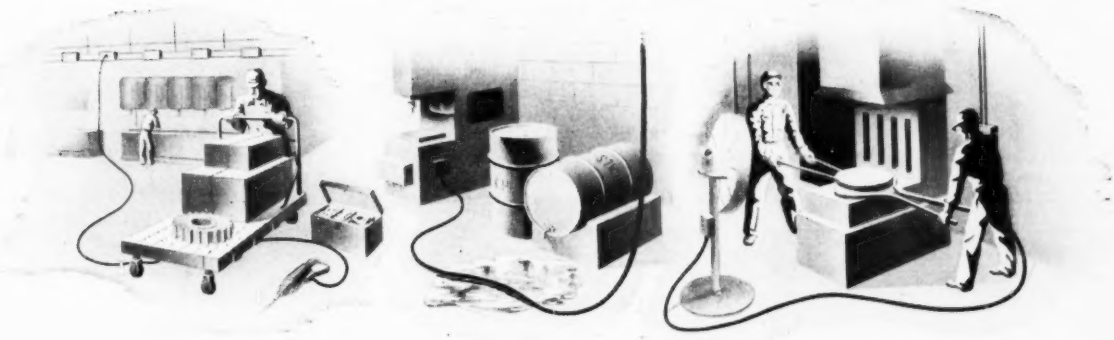
SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES

For more facts circle 585 on Reply Card

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

SUPER SERVICE

heavy duty portable cords and cables



TOUGHER!

LASTS LONGER!

SAVES MONEY!

BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

A dependable flow of power is basic to the efficient operation of any plant. That's why tough, versatile **SUPER SERVICE** cable is being used more than ever for heavy duty portable equipment.

New SUPERTUF neoprene mold-cured jacket provides excellent resistance to oils, chemicals, flames, impact, tearing, cutting, crushing and failure due to constant flexing. In addition, the mold-cured construction provides positive embossed product identification.

New THERMAX heat-resistant insulation gives extra protection against temporary overloads.

New SUPER SERVICE more compact construction prevents sleeving of the core from the jacket and provides you with a well balanced product that performs better, lasts a lot longer, needs less replacement. The cord-reinforced construction gives extra tensile strength and longer cable life. Why settle for less?

Ask your helpful General Cable representative or distributor for the complete facts now. Remember, General Cable is the *only* manufacturer who can provide fast, dependable service for *all* your wire and cable needs!

GENERAL CABLE CORPORATION

420 Lexington Ave., N. Y. 17, N. Y. • Sales Offices: Atlanta • Boston • Buffalo • Chicago Cincinnati • Cleveland • Dallas • Denver • Detroit • Erie (Pa.) • Greensboro (N. C.) • Houston Indianapolis • Kansas City • Los Angeles • Memphis • Milwaukee • Minneapolis • New York Newark (N. J.) • Philadelphia • Pittsburgh • Portland (Ore.) • Richmond (Va.) • Rochester (N. Y.) • Rome (N. Y.) • St. Louis • San Francisco • Seattle • Syracuse • Tulsa • Wash., D. C.

For more facts circle 586 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

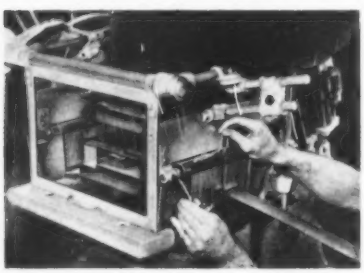
1—SHEET PACKING designed to seal against Freons

R/M R-54 is a compressed asbestos sheet packing for head gaskets on refrigeration compressors developed solely for air-conditioning and refrigeration uses, and claimed to seal effectively against Freon-22, as well as all other Freons. The binder in R-54 is a new type of Neoprene which has been specially extended, manufacturer explains, and 70 to 75 per cent of the sheet is asbestos.

According to company, the binder used swells when in contact with the refrigeration oil in the Freon, to assure a tight seal on the flange and fill all spaces. The new sheet also has a higher compression than many compressed asbestos sheets, which, it is noted, helps to correct improper flange design and requires lower bolt loadings. R-54 is furnished in standard thicknesses of 1/64 through ⅛ in. and in 11 sheet sizes from 40-by-40 in. to 150-by-150 in. Packing Div., Raybestos-Manhattan, Inc.

2—SAFETY DEVICE guards press operator's hands

This development is an air controlled die enclosure for punch presses limited to primary operations—of a type not requiring the full protection offered by company's Airgard. According to company, this enclosure provides safety, faster set-up, easier die change, reduced fatigue and unobstructed view. The



strong, transparent Lucite window is readily opened to permit easy die changes or to adjust stock, it is explained, but while the window is open, the press cannot be tripped. Opening the window automatically cuts off the air supply to the foot pedal valve and clutch cylinder by action of the cam-operated valve.

The illustration shows how adjustable finder side shields can be set to envelope stock and die clamps. One nut tightens or loosens all fingers in the side shield. The side shield can be adjusted to fit different strip stock and die size. Besides allowing a full view of die space, the Lucite window also serves to protect the operator's face and eyes from flying particles. American Allsafe Co., Inc.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 195-196.

3—BUILDING MATERIAL, translucent plastic sheet

Ceilite—a translucent plastic building material—is announced as available in corrugated sheets to nest with corrugated siding or in flat sheets for window glazing. Manufactured from light stabilized resins reinforced with 2-oz fiber glass mat, reports say it will not warp, sag, buckle, crack or craze and is resistant to all normally encountered acids, alkalies and industrial fumes.

It can be specified opaque as well as translucent and is available in a wide range of colors. Manufacturer points out that the shatterproof, lightweight, durable material cannot be ignited by burning embers, cinders or cigarettes. It is available in standard corrugations in sizes to 40 in. by 144 in. and in flat sheets in sizes to 36 in. by 96 in. or in standard window glazing sizes. Ceilite panels are said to be low-cost and easy to install; and they may be sewed, nailed, or drilled with ordinary tools. Ceilite Corp.

4—A-C WELDERS designed for low maintenance

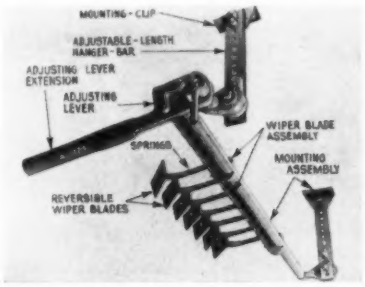
Consisting of NEMA rated 300-, 400-, and 500-amp models, this new line of a-c welders is offered for high speed production applications. The welders feature stepless current control, silicone insulation, aluminum coil windings and current scale large enough to be read at considerable distance. Fingertip current adjustment and quieter operation are attributed to a new feature in which the coil supports float in a special rubber bushing. Accurate current settings may be obtained, say company engineers, since the welders utilize the moving primary coil design and a large current

scale with wider calibrations in the lower ranges. Simplicity of this design is said to result in a minimum of vibration and mechanical wear and easier maintenance.

Wide current ranges let welders be used on almost all industrial applications ranging from light-duty, low current to heavy-duty, high current welding jobs. They are declared especially suited for heavy section welding where high current is desirable and when arc blow would otherwise cut welding speed and quality. The new welders are available for 220/440 or 550-v operation. Bulletin GEG-1259 gives specifications. General Electric Co.

5—SPRING TYPE CLEANER for conveyor belt use

Designed to remove material adhering to the belt after discharge, this improved cleaner serves to prolong belt life by preventing cover wear. Steel wiper blades



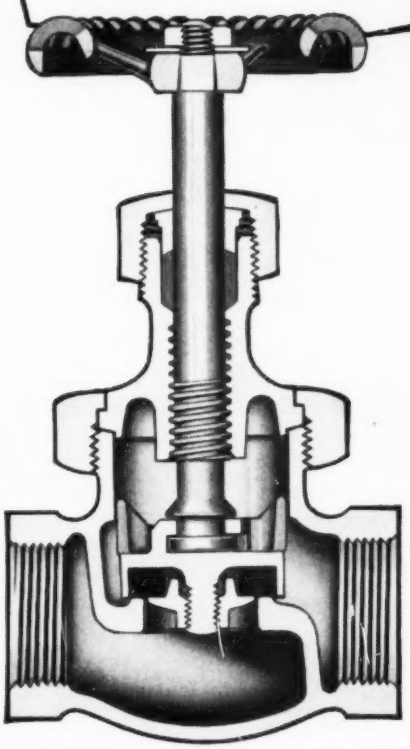
perpendicular to the belt surface, but diagonal to its line of travel, scrape off material, allowing it to fall to the discharge chute. Since the wiper blades are mounted on spring arms, pressure against the belt can be adjusted for different operating conditions.

It is explained that formerly these spring steel arms exposed a flat surface to the dribble falling from the wiper blades, allowing some material to build up. To remedy this condition the new cleaner design incorporates a twist in the arm so that a vertical edge is exposed to the falling dribble. The cleaner uses no moving parts and is designed with adjustable mounting brackets to fit any belt conveyor head pulley assembly. Details are given in Bulletin 651. Stephens-Adamson Mfg. Co.

6—IMMERSION HEATER has a thermostatic control

Thermostatic control, which eliminates necessity for a separately mounted and wired temperature regulating device, and company's Corox element are combined in this one-piece immersion heater. It is reported to convert any domestic water tank up to 110 gal capacity to automatic

A New Disc . . .
A "New" Valve



Crane No. 7 Brass Valves with quick-change composition disc

Save time, trouble, and money by standardizing on these Crane quality 150-Pound Valves. Simple to service. No big inventory of replacement parts. Just a few extra disc holders . . . a supply of composition discs. That's all you need for a wide variety of fluids . . . and an economical maintenance program.

The composition disc takes most of the normal wear—stands up well under ordinary usage—seats easily even on air and gas—absorbs foreign particles that might cause leakage in metal disc valves. When a leak shows up, make a "new" valve—with a new disc. Simply dismantle the union ring, lift out the trimmings, replace the disc holder assembly. Takes only a few minutes. Save the disc holder you removed—use it with the next replacement disc.

Rugged construction throughout. Sturdy bonnet joint, well reinforced by heavy union ring—can be repeatedly dismantled and reassembled. Get better acquainted with the Crane No. 7 line . . . for steam, hot and cold water, air, oil, gas, gasoline, and many other fluids.

GLOBES, ANGLES, AND CHECKS

Ask for folder AD-1682R—contains full facts on the No. 7 brass valve line and the companion No. 27 check. Your Crane Representative has a copy for you—or write direct to address below.

No. 7 Globe
Sizes ⅛ to 3-inch

No. 7 Angle
Sizes ⅛ to 3-inch

Specify No. 9 for Flanged Ends

No. 27 Check
Sizes ¼ to 3-inch

THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 154)

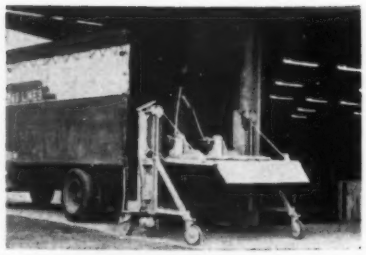
electric heating. Thermostat may be adjusted to maintain constant water temperatures from 120 to 180 F. Manufacturer points out that the heater is easily installed — merely screwed into the tank through a pipe opening in tank wall and proper wiring. Unit is available in power ratings from 750 to 2500-w for either 118 or 236-v applications. Steel heaters are also available with similar ratings for oil heating. In addition to water tanks, units are applicable to laundry, laboratory, dairy equipment and steam tanks. Westinghouse Electric Corp.

7—FOUR-TON CRANE is compact and economical

Designed to lift 4 tons at 10-ft radius, this new crane follows the general design principles of company's other models. It incorporates the gas-electric principle of operation, and includes self-resetting limit switches on hoist and boom hoist motion, automatic overloads and cut-out and reversible steering. The crane is compact in size, measuring only 7 ft 6 in. wide. Company points out that this model is extremely economical to operate — requires only a gallon of gasoline per hour. Coles Cranes, Inc.

8—AUTOMATIC CONTROL for variable speed transmission

Now available for the Speed-Trol, a variable speed transmission, is a pneumatic control. This Conoflow unit uses a ConoMotor and provides an automatically controlled drive for processing operations involving variables such as pressure, temperature, liquid level, proportional flow and control of rewind. The complete pneumatic control system is described as simple, yet accurate and reliable. It comes in both manual and automatic types which are sensitive to many types of electric, mechanical or pressure signals. Sterling Electric Motors, Inc.



10—PORTABLE DOCK for loading trucks from ground

Motor trucks may be loaded or unloaded from ground level with this portable loading dock, it is announced. The unit can be rolled by two men right up to the tailgate of over-the-road trucks. Here, a hand truck is drawn onto the dock's elevating platform and raised to motor truck bed level. Unit loads are drawn onto the loading dock and lowered to the floor where they are transported to storage or production areas. Dock has a capacity of 6,000 lb. Its battery or a-c powered elevating mechanism will raise loads up to a maximum height of 56 in. Because of its portability, it may be used either inside or outside the plant, and when not in use, it folds for storage. The Raymond Corp.

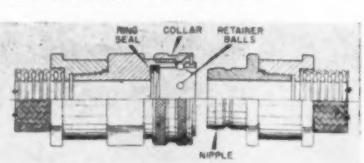
11—PLATFORM TRUCK will stack in 56-in. aisle

This 4000-lb capacity electric rider platform truck, the Warehouser RL-4, is reported to stack in as little as a 56 in. aisle. It has three speeds forward and three in reverse, with time delay controls between speeds for smooth acceleration. A foot operated brake cuts off power when operator leaves the truck. Steering is facilitated by spur gear reduction to drive unit with an arc of steer of over 200 deg. Spinner knob on steering wheel affords one hand operation. Wide faced rear wheels are designed for good load distribution and stability. Operator's compartment has sufficient space for comfort and a steel side guard for protection. The Yale & Towne Mfg. Co.

9—QUICK-SEAL COUPLING comes in heavy-duty models

For high pressure, heavy-flow applications in the steel, oil, chemical, construction and other industries, this company's quick-seal coupling is now made available in heavy duty models. As explained, this coupling is based on a simple construction which makes the hose line leak-proof the moment the nipple is seated in the coupling body — and seals it tighter, the higher the pressure builds up. In addition, the coupling has a full-swiveling feature which serves to prevent hose kinking.

The coupling is made in several types for different methods of hose attachment — female pipe thread, male pipe thread, expansion ring, or barb shank type. All types are interchangeable in the same size. The size range—up to 12 in.—includes eight standard sizes from ¼ to 2 in. available from stock, and 10 sizes from 2½ to 12 in. furnished on order. Standard materials are cadmium plated steel with Neoprene and Buna-N seals. Other materials of construction are available on order. Titeflex, Inc.



12—STEAM JET CLEANER is portable, easily operated

Rapid cleaning of motors, compressors, condensers, machinery and engines — without dismantling — is claimed possible with the Model 111 Steam Kleen Jet Sprayer. In this cleaner, the steam jet feed is operated by finger tip control. Changeover from wet to dry steam is instantaneous, says manufacturer, and accomplished by merely tilting the unit from the horizontal wet-steam position to

the vertical dry-steam position. The unit is designed to degrease as it cleans and can be used on small parts, too.

Light in weight, the Model 111 weighs about 16 lb ready for operation. It has a capacity of ½ gal of water and can be brought up to operating temperature from cold water in 20 min. With hot water, the waiting period is shortened. Company says normal degreasing time is approximately 20 min. The unit is electrically heated, thermostatically controlled, and operates on 110- and 115-v circuits. Henry Flow Control Co.

13—WIRELESS INTERCOM for interplant communication

Plug the Port-A-Phone into a standard 120-v a-c or d-c outlet and it's ready to work, says company. This compact portable intercom is designed for instant two-way communication between two,

three or more persons in separate departments or buildings. It is claimed to have super sensitive sound pick-up, so that voices up to several hundred feet away are picked up and transmitted up to 2½ miles within the same power-line transformer circuit. And it has a silencer to eliminate line noise when standing by. Of plastic with a mottled mahogany finish, the Port-A-Phone is 8¼ in. wide, 5⅝ in. deep and 6 in. high. A complete two-station system is priced around $67.00. General Industrial Co.

14—LIQUID CHEMICAL for water wash paint booths

Presto-Mat is a new liquid chemical for water wash paint spray booths. According to manufacturer, Presto-Mat is especially effective because its liquid form

She tests her purchases **Do you?**

If you are the average cooling tower owner, you do not test your purchase. In fact, Mr. Average Owner knows less about the actual performance of his cooling tower than his wife does about the interior of the melon to which she has applied the "squeeze and sniff" test. True, cooling towers are purchased for a specified performance; but the difference between "specified" and "actual" is sometimes astounding and only a test will tell.

"Test Your Tower," a new Marley technical publication, outlines a simplified straight-line method by which you can test your industrial cooling tower and arrive at positive results. By applying this test you *know* whether or not your "guaranteed" tower does the job it was specified for.

You can test your tower under any normal operating condition, and the Marley method of analysis will give you an accurate, conclusive comparison with guaranteed performance. Fill in the coupon, get your copy of "Test Your Tower" . . . then test it. Your Marley engineering service representative in major cities can also supply this brochure, just call him.

MAIL COUPON TODAY

MARLEY

Founder-member of the Cooling Tower Institute

The Marley Company

Kansas City, Missouri

Technical Services Dept.
The Marley Company
216 W. Gregory Blvd., Kansas City, Mo.

Please send me a copy of your new brochure, "Test Your Tower."

Name.....

Firm.....

Address.....

City.....State.....

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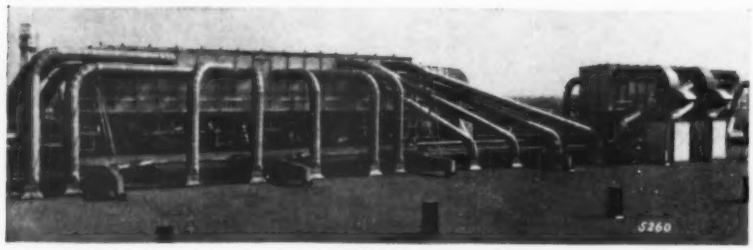
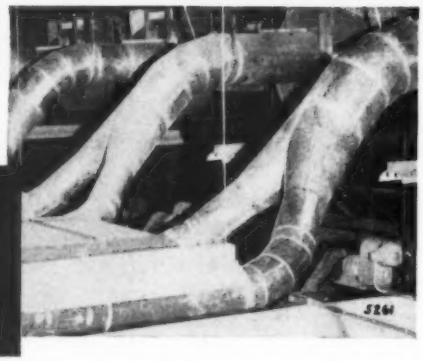
SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL



Philip Morris plant at Louisville, Ky. with Sly Dust Filters on roof.

Ducts leading from tobacco separators to Sly Dust Filters handling a total of 96,000 cfm.



NO DUST HANG-OVER

PHILIP MORRIS IS GLAD THIS YEAR THEY INSTALLED *SLY* YESTERYEAR

● Something wonderful happened in the construction of this modern Philip Morris plant. It was designed and equipped for *dust-free* operation.

Tobacco dust, created in stemming operations, is drawn through ducts to the four large Sly Dust Filters on the roof, and thoroughly filtered.

The clean air is then returned to the plant and recirculated — saving substantially on winter heating costs.

Philip Morris knows the value of Sly Dust Filters by experience, having purchased these units throughout the past five years.

Because of their larger filtering capacity and easy replacement of bags, Sly Dust Filters offer definite advantages in economy of operation and lower maintenance.

If you will tell us your dust problem we shall be glad to tell you what can be done about it and give you an estimate of cost.

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 2, OHIO

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NEW PRODUCTS

(Begins on page 154)

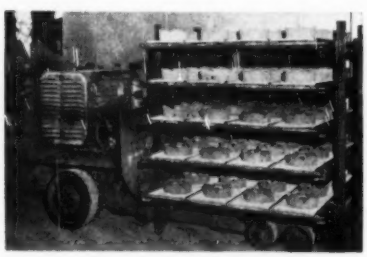
means no pre-mixing, good solubility and no sediment or clogging. It is also noted that since it is compounded double strength, it is more economical to use, store and ship. Presto-Mat is added to the water in the tank reservoir where it combines with paint sludge to form a floating mat, which may be skimmed from the surface of the tank reservoir so that the spray booth curtain, nozzles and metal parts are kept clean. Presto-Mat is designed to make possible a full and heavy water curtain, maximum air velocity and maximum paint reclamation. Chamberlain-Haber Chemical Co.

15—STAINLESS STEEL VALVES offered at lower prices

This new line of lower-priced stainless steel Rockwell-Nordstrom Lubricated Plug Valves is announced as especially suited for use in food, plastic sulfite pump and chemical plants. Featuring chrome-plated plugs, the new valves are suggested for many services in which this manufacturer's more expensive stellite-coate stainless steel valves have been previously used . . . as in services requiring stainless steel to prevent contamination or corrosion. The chrome plating backed by stainless steel offers protection against scoring, galling and other effects of corrosion. Meter and Valve Div., Rockwell Mfg. Co.

16—PLATFORM TRUCK is designed for slow lifting

The possibility of breaking or cracking fragile loads during lifting with industrial trucks is reported to be minimized



with this 10,000 lb capacity low lift platform truck. The vehicle is engineered as company's standard Model EP-10 except that it is equipped with a special slow-speed lifting jack which cushions the shock of raising and lowering. The Elwell-Parker Electric Co.

17—TACH GENERATOR with high voltage output

A low-cost d-c tachometer generator, announced for a variety of control applications and speed indications, can provide a high voltage output of 50v/1000 rpm for speeds to 5000 rpm, and 100v/1000 rpm for speeds to 2500 rpm. According to company engineers, it is an ideal pilot

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NEW MERCURY *Yank*

MODEL 630 FORK TRUCK

Shorter Turning Radius
Stacks from Narrower Aisles

Other advanced design features of the YANK 630

- New unit assembled drive axle with universal joint connected motor for quick and easy detachment; self centering hydraulic brakes; full floating axle shafts; Timken roller bearing mounted wheel centers.
- Balanced cross-suspension of hoist assembly eliminates destructive side forces when handling off-center loads.
- Contactors, control valves, etc., readily accessible.
- New controlled castor type steering axle—pivotally mounted for compensation over uneven surfaces—wheels center point mounted for effortless shock-proof steering—lower overall height permits lower operator position.
- Increased travel and hoist speeds—higher fork elevation.
- More convenient controls—greater operator comfort.

World's largest builder of industrial haulage equipment and originator of the "Trackless Train."

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Send for free literature illustrating and describing the new "Yank" Model 630 Fork Truck.

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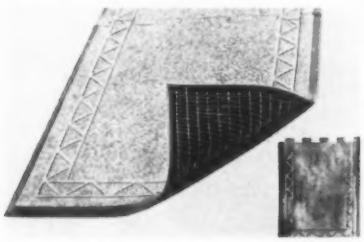
NEW PRODUCTS

(Begins on page 154)

exciter for many control applications. Industrial applications include measuring and controlling speed in manufacture of steel, aluminum, and paper, and on machinery. It is totally enclosed, can be either flange or foot mounted, and may be mounted vertically or horizontally. It is equipped with conduit box with a ½ in. straight pipe thread which permits conduit if desired. Shaft extension has flat section and stub shaft at one end for hand tachometer measurements. General Electric Co.

18—RUBBER RUNNER helps to reduce foot fatigue

Airstrip is a ½-in. thick rubber runner made in interlocking sections. It offers protection against hard, damp or cold floors by holding the user up off the floor, insulating the feet with cushions of warmth-retaining air space. According to company, Airstrip won't let the



feet "sink in" and yet it is resilient and full of life. The mats come in two sizes: 36-by-24 in. and 28-by-36 in. In four types, Type A, regular rubber, is suggested for assembly benches and shipping rooms. Type B, of grease- and oil-proof chemical- and acid-resistant rubber, is for machine shops and similar locations. Type C, a solid regular rubber, heavy duty mat, is for use where heavy carts are used. All of these come in black, but Type D, regular rubber, comes in marbleized shades of red, green and blue. R. L. Mitchell Rubber Co.

19—PLUMBING TOOL cleans clogged drains quickly

Mac's Plumbing Tool in the hands of any maintenance man will re-open a clogged drain in 10 min, says manufacturer. Air pressure of 150 to 200 lb, in a small portable tank of 1½ cu ft or larger capacity powers the tool. Pressure of air on backed-up water column in the clogged drain forces the clot of grease, lint, soap, hair, etc. on into the sewer. According to company, this tool doesn't just poke a little hole through —it takes out the main obstruction, and it can't harm the plumbing.

The tool threads into the drainage tee of the fixture backed up by stoppage at the point where the gooseneck or P-trap connects. A Neoprene plug around the air tube is then compressed by a backing screw to fill the tee and pre-

New G-E TRI 55 CLAD Motors

REG U.S. PAT OFF

NOW AVAILABLE THROUGH 10 HP!

Prompt Service, Quantity Shipment on these new motors...

TRI/CLAD '55' MOTORS—3-PHASE, 60 CYCLES, NEMA DESIGN B

HP	3600 RPM	1800 RPM	1200 RPM	900 RPM
½				K182 220/440v*
¾			K182 220/440v*, 550v	K184 220/440v*
1		K182 208v, 220/440v*, 550v		
1½	K182 220/440v*, 550v	K184 208v, 220/440v*, 550v	K184 220/440v*, 550v	K213 220/440v*
2	K184 220/440v*, 550v	K184 208v, 220/440v*, 550v	K213 220/440v*, 550v	K215 220/440v*
3	K184 220/440v*, 550v	K213 208v, 220/440v*, 550v	K215 220/440v*	K254U 208v*, 220/440v*, 550v*
5	K213 220/440v*	K215 208v, 220/440v*	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*
7½	K215 220/440v*	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*	
10	K254U 208v*, 220/440v*, 550v*	K256U 208v*, 220/440v*, 550v*		
15	K256U 208v*, 220/440v*, 550v*			

...and fast delivery on Sample Motors through 20 hp!

7½				284U 208v*, 220/440v*, 550v*
10			284U 208v*, 220/440v*, 550v*	286U 208v*, 220/440v*, 550v*
15		284U 208v*, 220/440v*, 550v*		
20	284U 208v#, 220/440v#, 550v#	286U 208v*, 220/440v*, 550v*		
25	286U 208v, 220/440v, 550v			

*** Indicates totally-enclosed motors also available.**
 # Dripproof only, TEFC available in 286U frame.

All motors obtainable with NEMA "C" face and "D" flange end shields, foot mounted or round frame. Splashproof motors in all ratings.

Motors can also be obtained for 50 cycles. 254 and 256 frames available in high starting torque or high slip NEMA designs C or D, except 3600-rpm motors.

There is prompt service on specials in the above sizes, too! Also new Tri/Clad '55' single-phase, wound-rotor, and hermetic motors are available.

If you wish the G-E Tri/Clad motor in the original design, they are still available . . . in ratings listed above and in ratings to 2000 hp.

To get even more recent availability information on standard and special motors, contact your nearest G-E Apparatus Sales Office or G-E motor supplier. *General Electric Co., Schenectady 5, N. Y.* 548-22

GENERAL ELECTRIC

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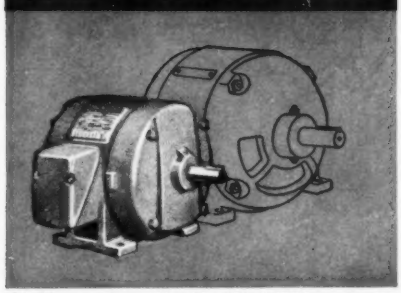
8 reasons why you should

MODERNIZE EQUIPMENT WITH TRI 55 CLAD MOTORS

REG. U.S. PAT. OFF.

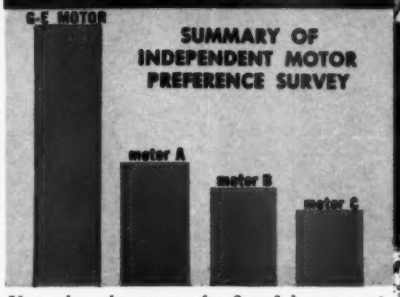
Plan now to modernize your equipment with the all-new General Electric Tri/Clad '55' motor, available now in many ratings; entire line of 1 to 30 hp a-c motors available soon. Contact your G-E Representative. General Electric Company, Section 648-6, Schenectady 5, N. Y.

MORE POWER PER POUND



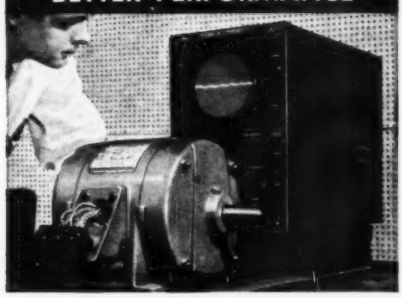
Lighter and smaller Tri/Clad '55' motors in new NEMA frame sizes and ratings save you space and weight, reduce handling costs.

BUYER PREFERENCE



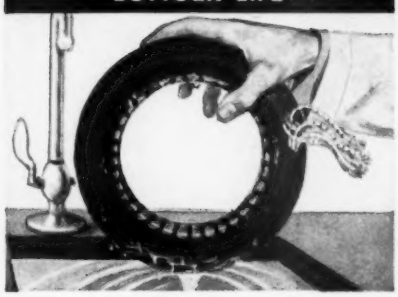
You take advantage of a 2 to 1 buyer preference for the electric motors on your equipment when you buy or specify a G-E motor.

BETTER PERFORMANCE



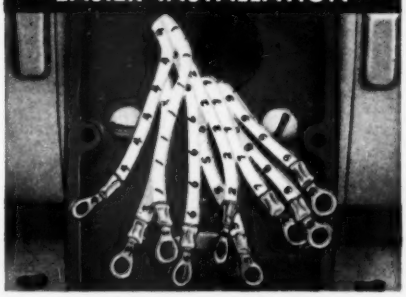
Quieter operation, proved by sound-room tests, is typical of the many performance improvements in the new G-E Tri/Clad '55'.

LONGER LIFE



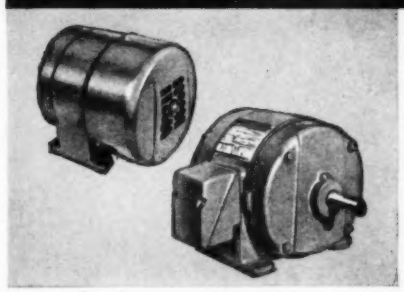
A silicone Dri-film* coating makes insulation shed water—lengthens motor life. Polyester-film insulation is 8 times stronger.

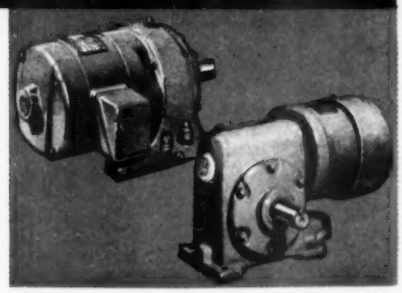
EASIER INSTALLATION



Perma-numbered leads are always instantly read even when wires are taped or clipped. Conduit box has plenty of knuckle room.

COMPLETE LINE OF NEW MOTORS





A complete line of new motors assures the right electrical drive for your machine. Write for Bulletin GEA-6013 on dripproof motors, GEA-6012, on enclosed motors. For low speed jobs, G.E. offers a complete line of gear-motors. Write for Bulletin GEA-6027.

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Progress is our most important product

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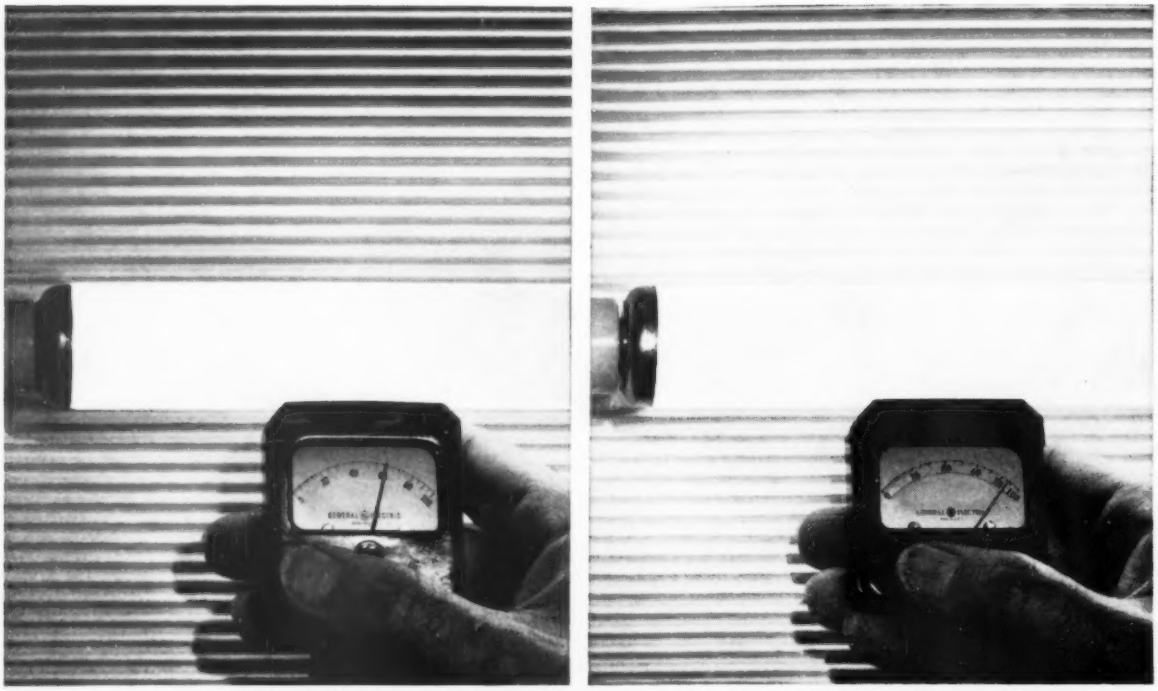

Regular slimline, left, gives 620 units of light. New High Output Rapid Start lamp, right, gives 840 units of light.

NEW GENERAL ELECTRIC FLUORESCENT LAMP GIVES ⅓ MORE LIGHT THAN ANY PREVIOUS FLUORESCENT

LIGHTS ALMOST INSTANTLY—General Electric announces the most important advance in fluorescent lighting in 10 years: the new High Output Rapid Start fluorescent lamp. The 96-inch High Output lamp gives 36% more light than the most powerful G-E fluorescent lamp previously available.

For new installations, General Electric High Output lamps offer this ⅓ bonus of light without increasing the number of fixtures or maintenance costs.

This big increase in light, with no increase in lamp size, has been achieved through a special cathode developed by General Electric which permits a boost in lamp wattage to 100. Because the cathode is of the famous General Electric triple coil design, these Rapid Start lamps light up almost instantly. General Electric High Output lamps have a rated life of 7,500 hours, the same as all General Electric general lighting fluorescent lamps.

A new G-E base and socket design protects the lamp contacts by recessing them. A simple push-pull sets the lamp in its fixtures.

HAS VARIETY OF USES

The new General Electric High Output fluorescent lamp is especially suited for use in areas with high ceilings, in factories, warehouses, offices and stores. Also in store windows, showcases and other places where you want higher lighting levels in keeping with the modern trend. New fixtures designed for the G-E High Output lamp will soon be available from a number of lighting fixture manufacturers.

For information, write to Lamp Division, General Electric Company, Dept. 166-PE-11, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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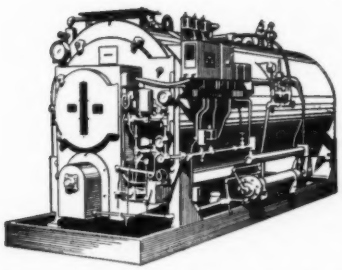


An Engineer Tells WHY Continental Boiler Tube-Sheets Have Long Service Life

"Pictured here is the rear tube-sheet of a packaged boiler, where the combustion gases at high temperature emerge from the furnace and sweep over the tube-sheet to enter the return tubes. Tube-sheet and tube ends are exposed to intense heat which may overheat the metal and cause serious damage.

"Tough problem . . . but the Continental features a simple solution:

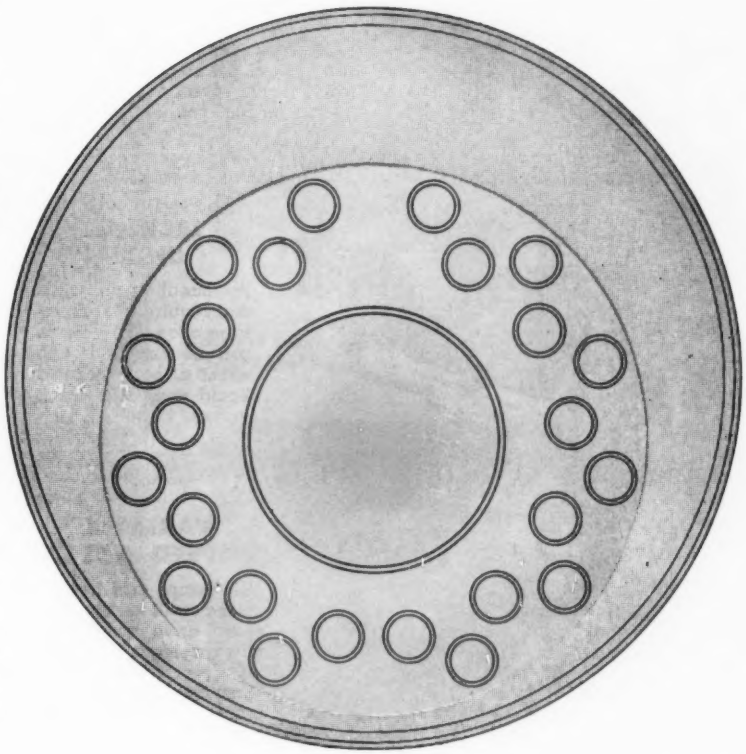
"(1) It provides equal flow of combustion gases to all return tubes so that all heating surfaces are equally effective.

"The Continental Boiler's two-pass design enables the hot combustion gases to transmit heat uniformly to the tube-sheet and tubes, thus making all surfaces equally effective.

"(2) The Continental Boiler provides adequate water circulation by proper arrangement of furnace and return tubes.

"It is essential that the large amount of heat carried to the tube-sheet and tube ends be quickly transferred to and absorbed by the boiler water. Sluggish circulation caused by close packing of return tubes may cause a heat block — with resultant overheating and damage to the metal.

"Note the symmetry of tube layout in the Continental Boiler. There is uniform distribution of heat over the entire tube-sheet . . . equal loading of all return tubes . . . free and balanced water circulation space — with single pass of return tubes."



EFFICIENCY — guaranteed over 80% for all sizes of Continental Boilers, from 20 to 500 hp. Dependable, trouble-free operation — for steam heating at pressures from 15 to 250 pounds . . . or for hot water heating at low or high temperatures.

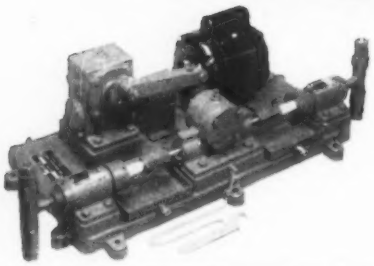
Write for Bulletins BE3 and BE4.

CONTINENTAL . . .
the boiler with the spinning gas technique

CONTINENTAL
Automatic Boiler
Manufactured by:
BOILER ENGINEERING & SUPPLY CO., INC.
Phoenixville, Pa.

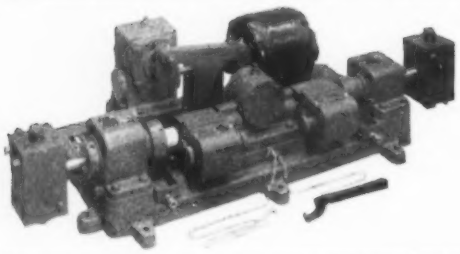
If you meter or proportion small volume flows...

THERE IS A HILLS-McCANNA "U" TYPE PUMP TO DO THE JOB



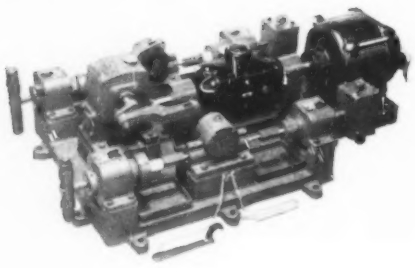
STANDARD 1, 2, 3 or 4 FEED UNITS

Standard "U" Pumps are available in maximum capacities from 0.10 to 24.0 gal. per hr. per feed. Operating pressures from 125 to 5000 psi.



JACKETED UNITS

For handling materials that require heat or refrigeration, "U" Pumps can be supplied with either or both jacketed liquid ends and check valves.



VARIABLE SPEED UNITS

"U" Pumps can be furnished with a variable speed drive which permits varying capacity remotely or automatically when combined with the proper auxiliary equipment.

Write for Catalog:

Catalog UP-52R gives full data on all sizes and types of Hills-McCanna "U" Type Pumps. Write for a copy, today. Hills-McCanna Co., 2450 W. Nelson St., Chicago 18, Ill.

HILLS-McCANNA

metering and proportioning pumps

Also Manufacturers of:
SAUNDERS TYPE DIAPHRAGM VALVES
FORCE FEED LUBRICATORS • MAGNESIUM ALLOY SAND CASTINGS

For more facts circle 595 on Reply Card

NEW PRODUCTS

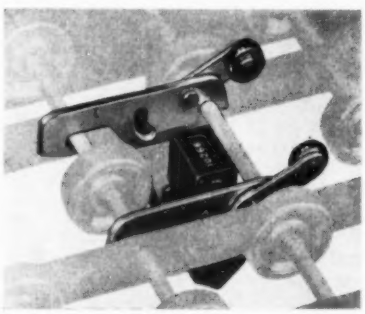
(Begins on page 154)

vent air leakage into the vent pipe. Attachment to a quick coupler on the air tank then gives a sudden blast of 150 lb of air to expel equal hydraulic water pressure on the stoppage and clear it. The tool comes in 1¼-, 1½- and 2-in. pipe sizes. The two smaller sizes, with 4-in. air hose and quick couplers, cost $105. Clark-Feather Mfg. Co.

To receive product data circle item number on the handy Reader Service Cards provided on pages 195-196.

20—CASE COUNTER simplifies counting, checking

An inexpensive case counter that provides an accurate, automatic check of the exact number of cartons or packages that have passed over a section of gravity wheel conveyor is announced. It fits



on the Rapistan 12-RS-6 or 12-RS-10 Gravity Wheel Conveyor without rearrangement of wheels, or on other models of 12- or 18-in. wide wheel conveyors by removing or rearranging wheels.

When a case or other item depresses the free-wheeling rollers on counter arms, the case counter is actuated by one digit. The unit counts up to 99,999, then starts over. There's a knurled knob for resetting the unit manually. The Rapids-Standard Co., Inc.

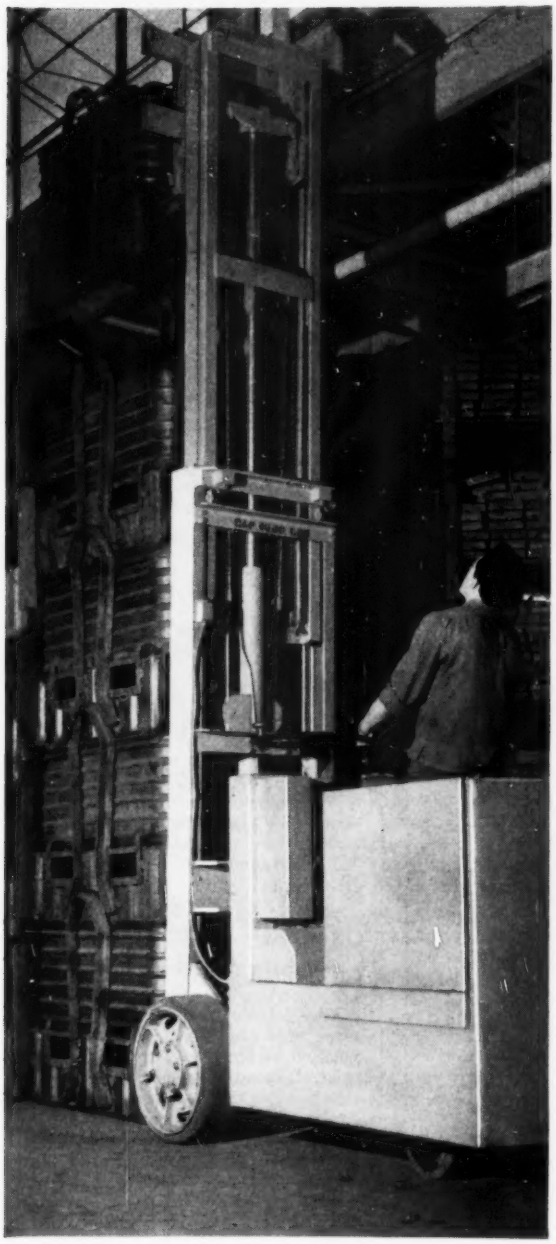
21—CONVEYOR PULLEYS feature interchangeable hubs

Type HD (heavy-duty) Steel Conveyor Pulleys with interchangeable split tapered hubs are announced as in the same price range as standard-duty types. The split-tapered hub, when drawn into the pulley end-disc squeezes its shaft with a bulldog clamp-grip. It is explained that this construction eliminates possibility of pulleys "walking" on the shaft and by locking the hub to the end-disc forms, for all practical purposes, a single unit for the life of the equipment. This feature is said to add to the life of the installation and reduce maintenance.

The line is designed to carry the maximum load that can normally be im-

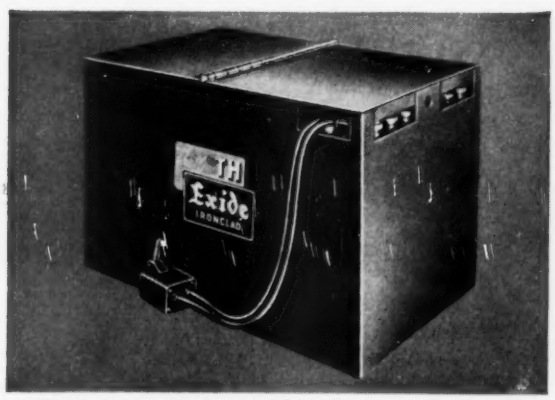
GET "FINGER-TIP" CONTROL, MORE LIFTS PER SHIFT

. . . with low cost Exide-Ironclad battery power!



ACCURATE STACKING, precise spotting, are essential for fast, safe materials handling. Exide-Ironclad Batteries respond instantly to any power need required for rapid, accurate handling operations. They enable trucks to handle as much load in the last hour of the shift as during the first . . . with no unscheduled down time. Lower costs for operation, maintenance, and depreciation make Exide-Ironclads the best power buy—AT ANY PRICE.

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power.* Also, more active material is retained, *giving longer working life.*



THE NEW THRIFTY HAULER! The improved industrial truck battery. *Non-oxidizing* plastic power tubes assure longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy . . . AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

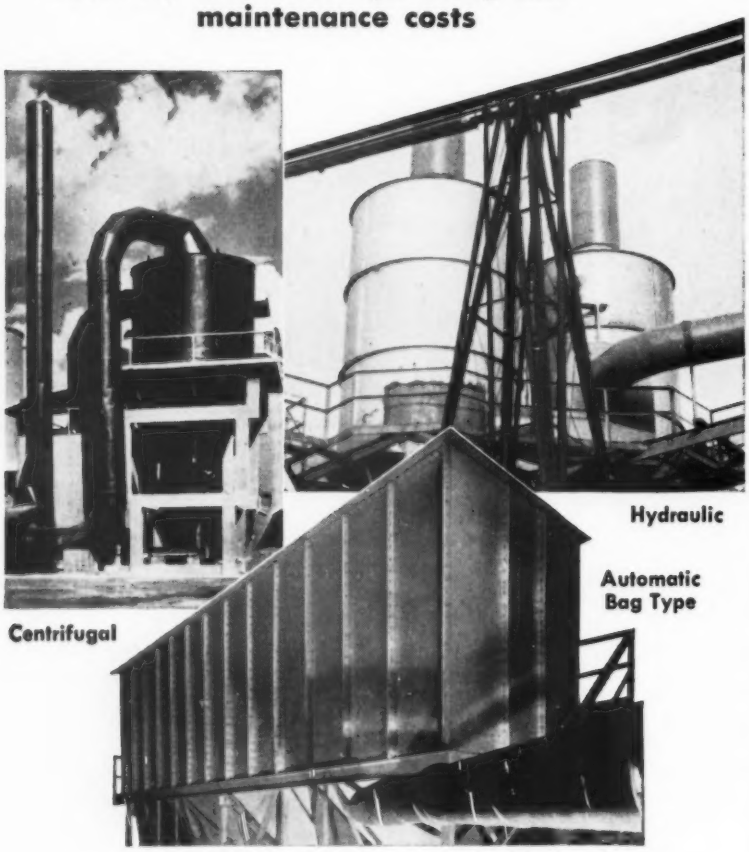
Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

For more facts circle 596 on Reply Card

Norblo

Dust and Fume Collection Systems

make outstanding records for high recovery with low operating and maintenance costs



These three important types of Norblo collecting systems, frequently used in certain combinations, bring you economical, dependable control as required in a wide range of industries. "Guaranteed Efficiency" is not an empty phrase at Norblo. We stand back of every installation that's used for the purpose and at the capacity for which we designed it. All component parts are made by Norblo, under controlled specifications.

For more than 40 years Norblo has engineered and supplied installations of every size in the rock products, smelting, chemical, metal working, milling and processing fields. It pays you to get the facts about Norblo Dust and Fume Collecting Systems. Give us a description of your problems.

The Northern Blower Company

Engineered Dust Collection Systems for All Industries

6423 Barberton Ave. OLympic 1-1300 Cleveland 2, Ohio

For more facts circle 597 on Reply Card

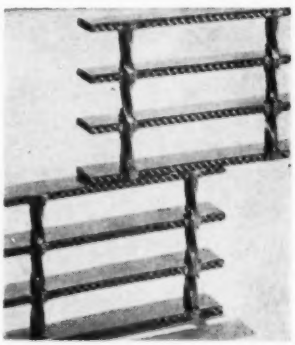
NEW PRODUCTS

(Begins on page 154)

posed upon it for use in any location, such as for drive, head, tail, snub, bend or take-up when used with the proper number of plies of 42-oz duck belts. The pulleys are available as standard in crown or straight face in sizes from 6- through 60-in. diam, from 12- through 63-in. face and for shaft sizes through 10-in diam. The American Pulley Co.

22—GRATING for use in skid hazardous locations

A new combination of safety factors is reported to have been built into Furro-Grip, an electroforged grating for use in areas where service conditions are likely to include skid hazards. As shown,

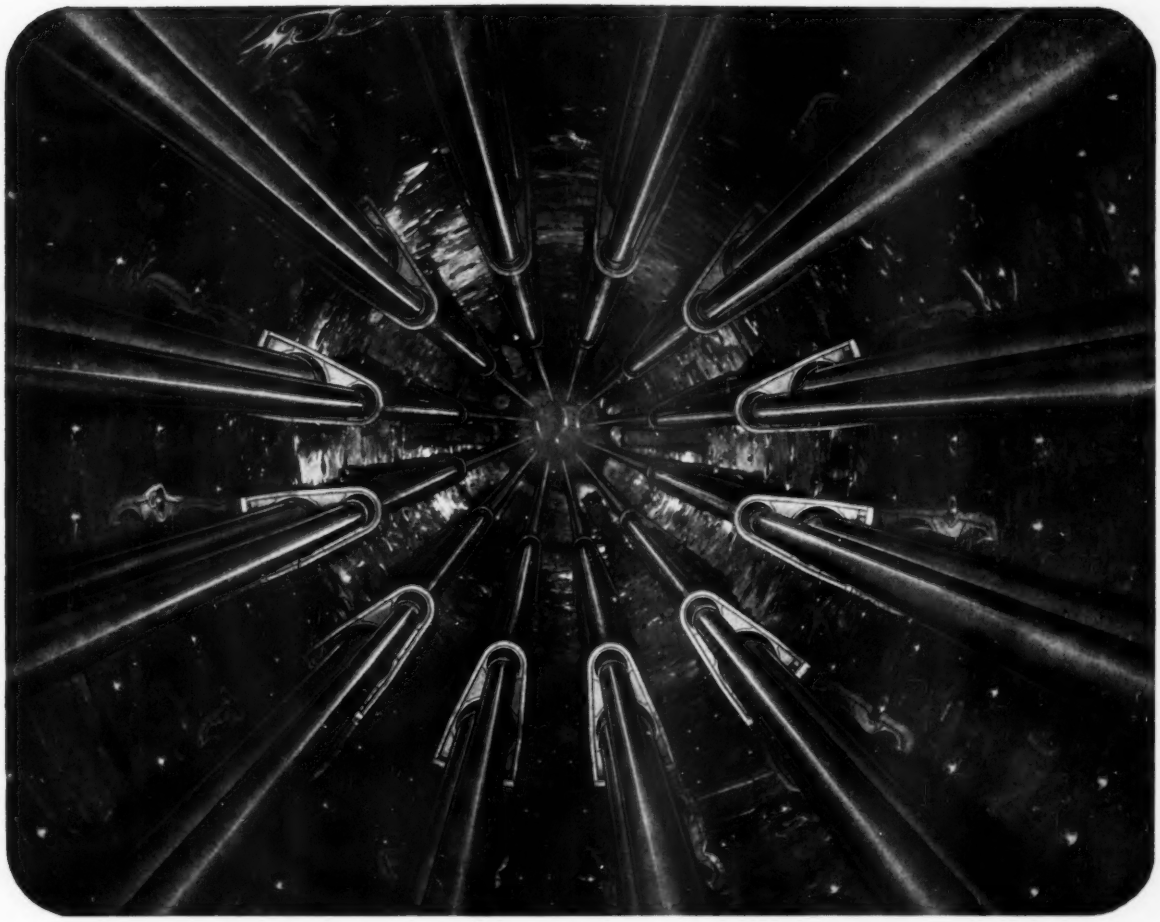


knurled bearing bars are combined with twisted cross bars, providing a smoother walking surface than serrated bars and an extra margin of safety over square bar grating. Furro-Grip is made from 0.20 maximum carbon steel in standard sizes from ¾ to ⅛ to 2¼ by $\frac{3}{16}$. Load bearing characteristics are similar to those of company's standard gratings. Blaw-Knox Co.

23—DRILL PRESS, 14 in., affords faster production

Designed to speed production, reduce operator fatigue and facilitate precision work, this new 14-in. drill press is announced as accurate, rugged and low in price. It incorporates all features of company's older drill and many new ones. Among the latter is a full-length belt guard hinged at the rear and counterbalanced to enable the guard to be swung up out of the way and suspended—like a car trunk lid—to facilitate cleaning and belt changes. A pivoting mounting plate permits quick belt tension release.

A modified quill on the new machine allows longer spindle travel, and a new side opening makes spindle removal easier. A quick-set gage which can be set to zero when drill contacts work, and gives a direct reading, and a self-locking depth stop calibrated to 0.002 in. with zero start and adjustable with one hand are also announced. The spindle return tension adjustment allows an infinite choice of tensions within a given range.



TRENTWELD STAINLESS TUBING gives longer operating life...

FREE—Write for your copy of the new TRENTWELD price calculator. Just a tug at the selector slide gives you complete price information and weight per foot of the tubing size and grade you need. Better send for your free copy now.

TRENTWELD stainless steel tubing gives economical, trouble-free service over long periods of use. It's an ideal choice, for example, for applications such as the 60-foot rotary kiln dryer you are looking into in the photograph above . . . operating at high temperatures and where corrosive conditions are encountered.

In fact, you just can't buy better tubing than TRENTWELD for any application. That's because TRENTWELD stainless and high-alloy *welded* tubing is a product of tube mill specialists. Each tube has a uniformly sound weld indistinguishable from the parent metal and just as strong and corrosion-resistant.

Whether or not your job is as large and complex as a rotary dryer, you can specify TRENTWELD tubing with confidence. And when it comes to tubing sizes and finishes, Trent offers the widest range in the industry . . . from 1/8" to 40" O.D. and up. Next time you have a job involving tubing, remember—you can make it better with TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

For more facts circle 598 on Reply Card

At American Viscose Corp.

Delivering truck will turn the key back to the American Viscose Corp. plant at Lewistown, Pa.

C & D Batteries for EXTRA work

American Viscose Corporation, is one of the world's largest producers of rayon, acetate, cellophane, meat casings, plastic resins, and fabric finishes. To help handle the millions of pounds of wood pulp, alkali, and acid moving through 8 plants in Pennsylvania, Virginia and West Virginia, American Viscose uses C&D Slyver-Clad* batteries as a major source of power for their industrial trucks employed in daily operation. For American Viscose, like hundreds of other important companies, has found it pays to power with C&D Slyver-Clad batteries.

C&D Slyver-Clad batteries are approved as standard equipment by all electric truck manufacturers. For further information, write for catalogs.

*T. M. Reg.

C&D

BATTERIES, INC.

of Conshohocken, Pa.

Manufacturers of Industrial Batteries since 1904

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

For more facts circle 599 on Reply Card

[illegible]

24 CLEANER [illegible]

[illegible]

25 FLOOR POLISH [illegible]

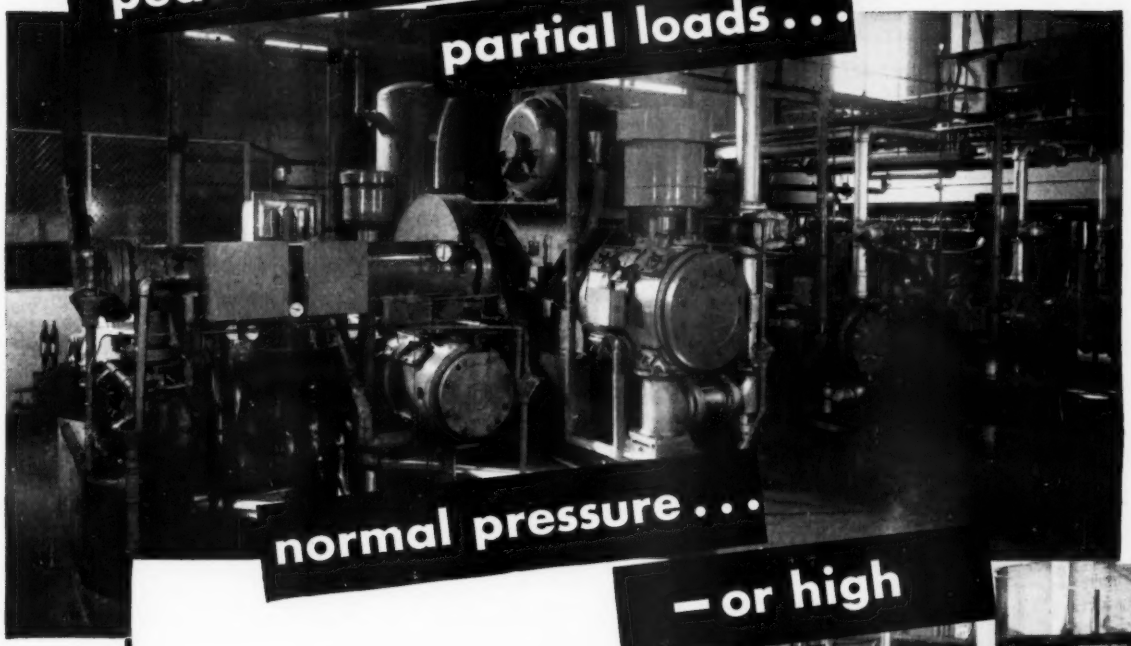
[illegible]

26 FORK LIFT TRUCKS [illegible]

Features announced for the [illegible] gasoline powered industrial fork lift trucks include [illegible] in. short turning radius and a low initial cost. Developed from designs for the armed forces, the new trucks come in 8000, 6000, and 6000 lb. models. Power is provided by

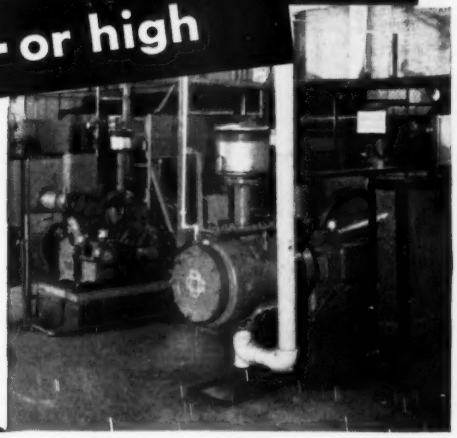
peak loads . . .

partial loads . . .



normal pressure . . .

— or high



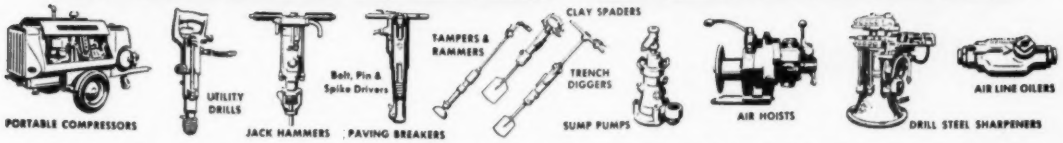
a GARDNER-DENVER COMPRESSOR

for every need!

. . . this Chicago manufacturer meets *all* compressed air needs with this efficient installation of *seven* Gardner-Denver Compressors.

SINCE 1859

GARDNER-DENVER



THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

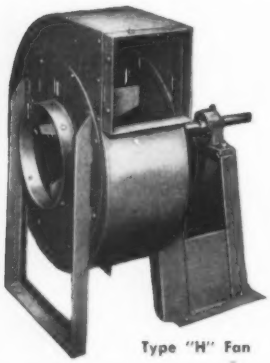
Gardner-Denver Company, Quincy, Ill. In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ont.

For more facts circle 600 on Reply Card

Bayley Provides The Solution . . .

. . . For Your AIR HANDLING Problems

WHETHER you require the removal of fumes, vapors, refuse—conveying of materials—air cleaning—or any other phase of plant or laboratory air handling, BAYLEY engineers may be relied upon to help you achieve the desired results. And BAYLEY Air Handling Equipment, properly designed and selected, will deliver trouble-free, ever-dependable service year after year. This fact is proved by the effective performance of BAYLEY Equipment in a wide field of industrial and technical applications.



Type "H" Fan

- CENTRIFUGAL FANS
- AIR WASHERS
- BLAST HEATERS

CHECK THE COUPON, below, for data and bulletins covering BAYLEY Air Handling Equipment of interest to you:

Bayley Engineered Air Handling Equipment

BAYLEY BLOWER CO.
1825 S. 66th St., Milwaukee 14, Wis.

Please send illustrated bulletins covering Bayley Equipment for:

☐ INDUSTRIAL EXHAUST ☐ PNEUMATIC CONVEYING
☐ PROCESS CONDITIONING ☐ HIGH TEMPERATURE

FIRM_____

ADDRESS_____

For more facts circle 601 on Reply Card

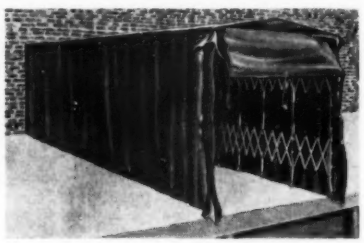
NEW PRODUCTS

(Begins on page 154)

heavy duty industrial engines. The transmission features an 11-in. clutch rated at twice the torque capacity of the engine. There are two speeds in both forward and reverse. Steering is all-steel knuckle type mounted in rubber blocks and pivoted longitudinally. New steering geometry and anti-friction bearings in knuckles are designed to inhibit wheel scrubbing and make turning easy on the operator. The Baker-Raulang Co.

27—DOCK SHELTER is big in size and portable

X-Tra-Span is designed for use on extra-deep loading docks, or as an efficient and economical means of connecting adjoining plants. Rolling on wheels,



it literally snakes out from the shipping room door across open docks to truck or box car. When not in use, it can be folded back around the shipping room door. These dock shelters can be custom-built to any length. Atlas Industries.

28—SNOW THROWER for the big removal jobs

The Champion is a rotary-type snow cleaning machine claimed to do the work of 10 men with hand shovels. Its ability to propel itself at 60 yd per minute, while clearing a swath 20-in. wide through hard-packed or slushy snow suggests

its use for walks, platforms, driveways, parking areas and other areas that have to be cleared in a hurry.

Powered by a 2½-hp gasoline engine, the Champion operates on the same principle as the giant rotary plows used on highways, which throw snow rather than blow it. A rotating "raker bar" for chewing up packed snow plus a wide-open front end are incorporated to clear away all types of snow. The Champion is easy

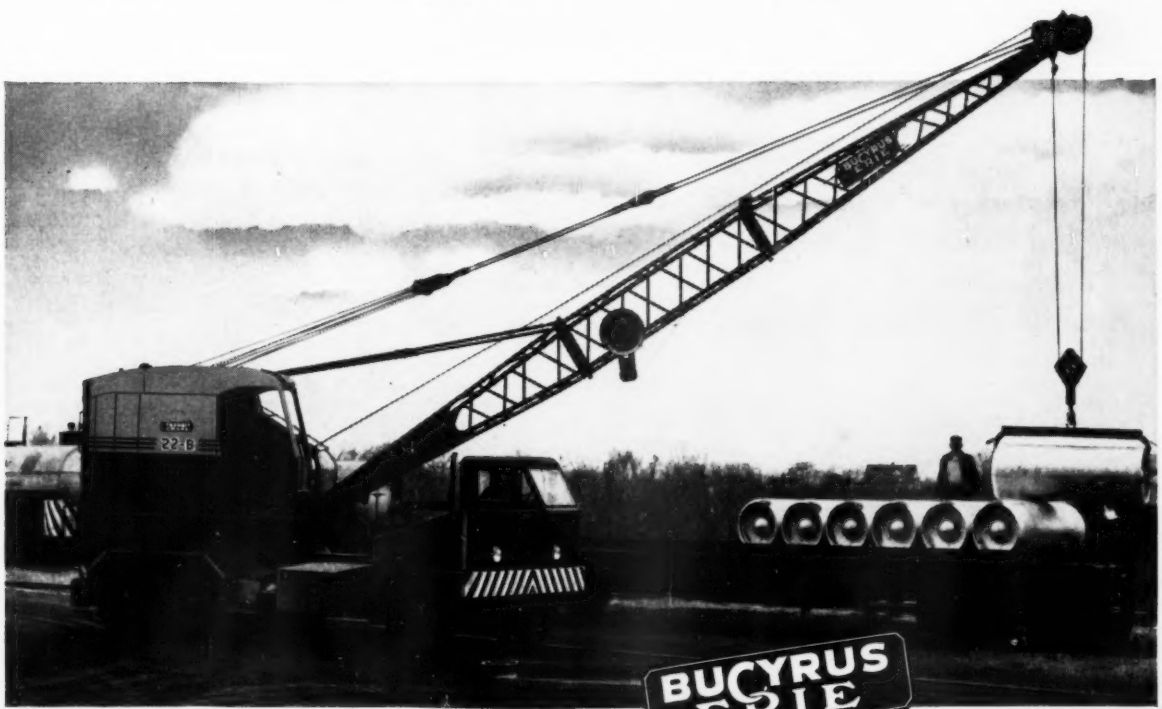
They Have What It Takes To Lower Your Material Handling Costs

BUCYRUS-ERIE CRANES

You can save time and money with a Bucyrus-Erie lifting crane on your jobs because every Bucyrus-Erie is designed as an individual model to meet the job requirements of its particular range.

Speed, power, strength and weight are all perfectly matched to rated lifting capacity. Operating machinery is concentrated behind the center of rotation, providing proper balance and ample strength. There is no excessive counterweight to swing, more power is available for the job. The flow of power from engine is guarded at every point against excessive friction loss.

If your operations call for high speed mobility, look into Bucyrus-Erie Transit Cranes (carrier mounted) with 15- and 25-ton capacity. There are also eight Bucyrus-Erie crawler cranes to meet any requirements — capacities range from 3- to 60-tons (nominal ratings). See your Bucyrus-Erie distributor for complete details on the machine that fits your needs. 52E54



SOUTH MILWAUKEE, WISCONSIN

For more facts circle 602 on Reply Card

Lowest Belt Cost

PER TON OF STEEL EVER PRODUCED BY ATLANTIC STEEL

Rhoads 81—10/12′ + Lap x 48″ heavy 3 ply Tannate Watershed Belt installed on 5 roll stand intermediate mill.

PROBLEM: To lower leather belt costs on a drive operating a 5 roll stand intermediate rod and Merchant Bar Mill and consequently to obtain lower manufacturing costs per ton of steel produced.

SOLUTION: After trying several makes of flat leather belting, Atlantic Steel Company, Atlanta, Georgia installed specially tanned 81-10/12′ + Lap x 48″ heavy 3 ply Tannate Watershed leather belting. This belt was specially tanned choice center stock leather developed by J. E. Rhoads and Sons, and as a result was able to withstand terrific heat and moisture plus exceptionally heavy starting and shock loads. Belt speed varies from 2600′ per min. to 6650′ per min. with the product rolled. After running almost continuously for 2½ years during which time the mill rolled 218,515 tons of steel, the belt was taken off, cut up into narrow belts and used in various departments around the plant.

Besides stating that Rhoads Tannate Belts have out-produced all other previous makes on this drive, Atlantic Steel officials calculated the belt cost per ton of steel produced at $.0209 cents per ton, the lowest belt cost ever attained by them.

What is Tannate®?

Tannate is a special tanned leather belt. It combines exceptional grip, pliability, elasticity, strength, and durability. It will resist moisture, mineral oils and the fumes of most acids —will withstand high temperatures. For specifications, write J. E. Rhoads and Sons, 35 North Sixth Street, Philadelphia 6, Pa.

Be sure to see our exhibit at the Power Show, Dec. 2-7, Convention Hall, Phila. We've got something new in power transmission to show you.

RHOADS
INDUSTRIAL LEATHERS

PHILADELPHIA • NEW YORK • CHICAGO • ATLANTA

For more facts circle 603 on Reply Card

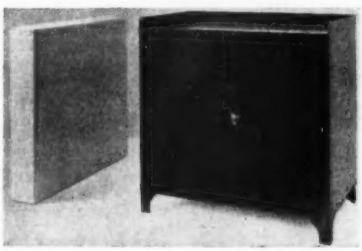
NEW PRODUCTS

(Begins on page 154)

to operate, says manufacturer — because it is self-propelled, an operator can guide it through drifts up to 20-in. deep with one hand. Jari Products, Inc.

29—TOOL CABINET is low in cost, saves space

A line of three knock-down Hallowell Tool Cabinets is announced for use in tool and maintenance rooms, and garages. They have advantages over welded cabinets in space and cost savings, it is reported, and can be quickly assembled in four simple operations with only a screw



driver and wrench. As illustrated, the steel parts can be packaged for shipment in cartons one-quarter the assembled size. Prices are quoted as 15 to 25 per cent less than those on similar welded cabinets in company's standard line. The baked-on green enamel cabinets come in single or double-door models, can be furnished with detachable feet or with 3-in. steel-tread or rubber swivel casters, have chrome-plated locking handle for the doors, and have 2-in. sides and back on the top to prevent tools from sliding off. Standard Pressed Steel Co.

30—DIAPHRAGM VALVES with polyvinylchloride bodies

In response to the growing interest in polyvinyl chloride, this company has added valves with bodies of PVC to their line of Saunders Patent Diaphragm Valves. Coupled with the design of these valves, PVC expands the extensive list of corrosive materials that can be handled, it is noted, and also provides a corrosion resistant valve for PVC piping layouts. Handwheel-, lever-, sliding stem-, and air-operated types are available in sizes ranging from ½ through 2 in. Screwed ends are standard, but slip fits may be ordered. Hills-McCanna Co.

31—LIFT TRUCK is battery powered, riding type

Company's Riding Type Power Ox is announced as the first model of this lift truck to let the operator ride. The movement of more materials per man is the aim of this design which, company points out, enables operator to stand—permitting quick mounting and dismounting. Located in the steering handle are forward and reverse push button controls, and dual

GIVES YOU ANY RPM— AND ONLY 14¼" HIGH!

FRACTIONAL HORSEPOWER
VARIABLE SPEEDS—IN SMALLEST PACKAGE

HERE'S the new variable speed motor that cost-conscious plant operators have long sought. It's the light weight U. S. Varidrive, Type VA, compactly dimensioned to occupy least space, yet suitable for rugged industrial duty just like the larger HP Varidrive line. Compact dimensions and light weight now make built-in application of variable speeds practical. You can mount it right on your machine, close in; or in any position on floor, wall or ceiling, with or without remote control.

Quick, Accurate Dial Control

Full speed range instantly obtained in less than one turn of dial handle. The stationary dial plate is precisely calibrated for close speed setting, yet easily visible from a distance.

Gets You More Production

You can greatly increase the performance and output of your machine using fractional horsepower with Type VA. You can now get the exact speeds needed for each operation. Your operator can control the speed to a split rpm to accomplish better workmanship and to actually gain more output. This amazing motor invariably repays its low-cost investment within a few weeks.

14¼" High x 8½" Wide
Weight—87 Lbs.
Easiest Dial Control
Single and 3-Phase

U.S. VARIDRIVE MOTOR

Bulletin Chock-full of Facts

You'll want to study the internal workings of this revolutionary small horsepower motor—see how it works, note the high excellence of materials and the advanced engineering skill that makes Type VA the wonder motor. All the facts are interestingly presented in Bulletin No. 1797. Engineering details and many types shown.

U. S. ELECTRICAL MOTORS INC.
Los Angeles 54, Calif. Milford, Conn.

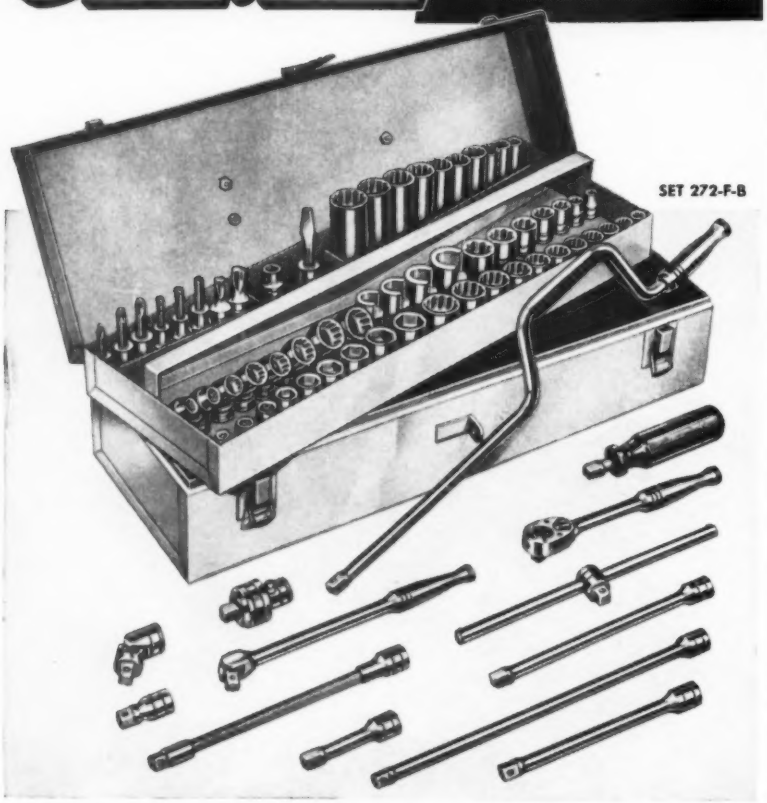
REQUEST VARIDRIVE BOOKLET

U. S. Electrical Motors Inc. PLE-11
Box 2058, Los Angeles 54, Calif. or Milford, Conn.
☐ *Send Varidrive Bulletin 1797*
NAME_____
COMPANY_____
ADDRESS_____
CITY ZONE STATE

For more facts circle 604 on Reply Card

Slim-fast-versatile

Snap-on* Ferret Wrenches



—for top speed in tight spots

Here is one of the most adaptable, time-saving wrench kits you can put in the hands of maintenance or production workers—a complete set of Snap-on's famed Ferret wrenches. The set includes all handles (⅜" square drive), adaptors, extensions and sockets (¼" to ¾"), to speed a wide range of jobs. Handles are long, slim, strong, with patented "Palm-Grip" for real working comfort. 4-way socket grip for quickest handle hook-up. Available through your nearby Snap-on factory branch. Write for Snap-on Industrial catalog and general catalog of 4000 hand and bench tools.

SNAP-ON TOOLS CORPORATION
8068-K 28th Avenue, Kenosha, Wisconsin
*Snap-on is the trademark of Snap-on Tools Corporation.

For more facts circle 605 on Reply Card

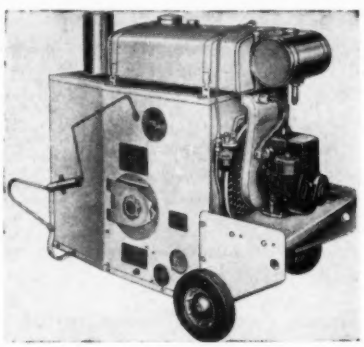
NEW PRODUCTS

(Begins on page 154)

trigger hand-operated brake controls for operation with either hand. Automatic speed acceleration is provided, with four speeds forward and three in reverse. The unit lifts and travels electrically, using a 24-v battery. It has speeds to 6 mph with no load, and 3½ mph with load. This truck is built in standard capacities of 4000 and 6000 lb. Barrett-Cravens Co.

32—PORTABLE AIR HEATER offers quick power change

The Herman Nelson Utility Model, a portable air heater, can be converted from electric motor to gasoline engine power in minutes, it is claimed. A conversion kit allows the electric motor to be replaced with a gasoline engine, and



vice versa. It is optionally oil-fired or gasoline fired, says company, yet is safe with fumes vented outside the work area, and may be operated indoors without danger from fire.

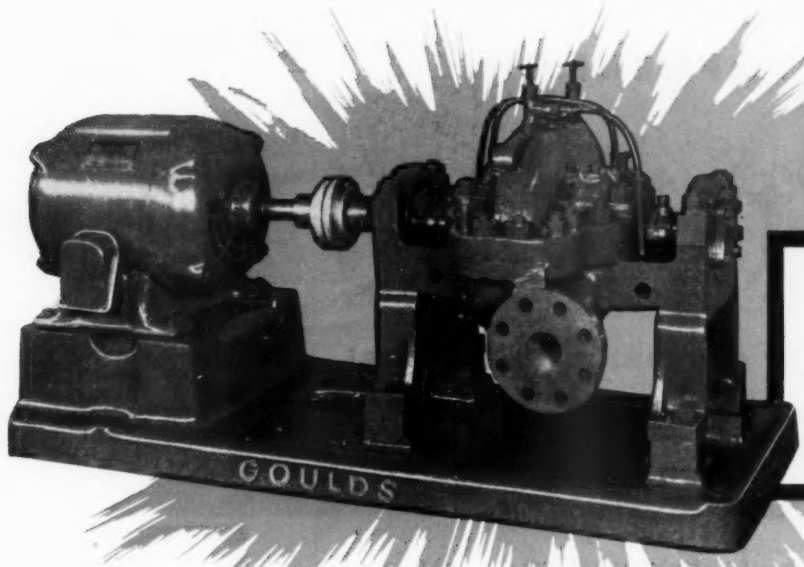
From 75,000 to 425,000 Btu of heated air can be supplied by the heater. Being self-contained, its operation is declared simple. American Air Filter Co., Inc.

33—SULFUR CEMENT is hot poured, plasticized

Vitrobond, a hot-poured plasticized sulfur cement is announced for capping concrete test cylinders, forming hubs of discs, such as grinding wheels, and embedding metal structures in concrete. Properties of Vitrobond are claimed to exceed requirements of A.S.T.M. Specification C287-52T. Manufacturer says that within 10 min. after pouring, Vitrobond is essentially as strong as concrete after 30 days curing. The Atlas Mineral Products Co.

34—MOTORIZED VALVES for automatic fuel control

A line of motorized valves is announced for automatic fuel control on gas-fired boilers, furnaces, ovens, kilns, and other gas combustion systems. Two-wire motor operator, soft Neoprene seat construction, and sturdy lightweight aluminum body (FM approved) are main features announced for the valve. The spring-loaded plunger and Neoprene seat are designed



announcing...

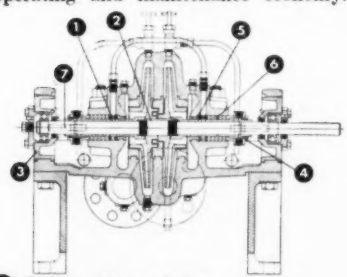
the Goulds Fig. 3305 two-stage, opposed impeller pump for clear liquids. 5 sizes. Capacities to 1200 GPM. Heads to 1000 ft.

This new Goulds pump offers you 5 specific operating and maintenance advantages . . .

To reduce your liquid-handling costs through greater standardization, easier maintenance, and improved operating characteristics, Goulds engineers have developed the *new* Goulds Fig. 3305 two-stage, opposed impeller centrifugal pump. Here are the highlights—the result of 50 years concentration on industry's centrifugal pump needs.

1 High operating efficiency, low maintenance cost

The Fig. 3305 pump combines the seven features indicated on the sectional drawing below to contribute a quality of dependable service which adds up to true operating and maintenance economy.



1. Teflon water-seal rings.
2. Stainless steel impeller key.
3. Bearing housing sealed against moisture and dirt.
4. Cowl-type glands suitable for use with quenching liquids.
5. Renewable stuffing box bushings.
6. Die-formed stuffing box packing.
7. Corrosion-resistant gland bolts.

2 Reduces your spare parts inventory

Only two shaft and rotating parts assemblies provide for 5 pump sizes and 10 pump combinations. This means a remarkable range of parts interchangeability which you will find detailed on page 7 of the descriptive bulletin. Furthermore, most of the components of the Fig. 3305 shaft and rotating assemblies are interchangeable in the Fig. 3405 single-stage, double-suction pump which has won industry-wide acceptance in the year since it was introduced.

This high degree of standardization helps materially to reduce spare parts inventories. It also gives you great flexibility in adapting your Fig. 3305 pump to changing field requirements.

3 Saves space

The short bearing span of Fig. 3305 pumps means considerable saving in floor space—as much as 50% in some comparisons with conventional designs of comparable capacity and head.

4 Stuffing box to match your requirements

You can choose either a conventional stuffing box with gland or a mechanical seal, according to your need. And you can easily change from one to the other at any time.

5 Simple to change rotation

A patented locking device makes it easy to change the rotation of this pump from right-hand to left-hand or vice versa *in the field and without additional parts.*

Before you select another pump for handling clear liquids at rates up to 1200 GPM and heads to 1000 ft., be sure you have the detailed cost-advantage story of Goulds new Fig. 3305 pump. We'll send you descriptive bulletin—promptly on request.

Get the complete story—This 12-page illustrated Bulletin No. 722.6, covers the new Goulds Fig. 3305 pump completely. It gives specifications, interchangeability tables, performance curves, dimensions.

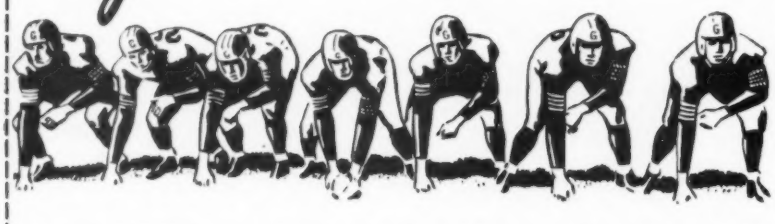
MEMBER HYDRAULIC INSTITUTE U.S.A.

Goulds PUMPS INC.
Seneca Falls New York

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • TULSA

For more facts circle 606 on Reply Card

This *Gaco* NEOPRENE LINE



Can STOP your corrosion problems!

Here's the all-star line-up of GACO Neoprene Products for complete corrosion protection. Select the best GACO Product for your requirements from this table.

Product Name & Number Type of Service	Typical Applications
Gaco N-700 — Neoprene Maintenance Coating Gray, Slate Black, Aluminum For corrosive fumes and splash service	Excellent corrosive fume and splash protection for outside surfaces of equipment, structural steel, wood and concrete. With addition of grit, GACO N-700 provides SKID-PROOF surfaces on steps, ramps.
Gaco N-200-I — Neoprene Liquid Lining For immersion service (irregular surfaces)	Vats, valves, impellers, chemical process equipment, pipes, condensers, shafts, sea chests, tanks, pumps, conveyors, fans, and other items having irregular surfaces and odd shaped and perforated forms.
Gaco N-350-I — Neoprene Uncured Sheet Stock 1/16", 1/8" & 3/16" thick For immersion service (regular surfaces)	For lining tanks and equipment having fairly regular surfaces and where greater thickness is required for heavy duty services.
Gaco N-35 — Neoprene Cured Sheet Stock 1/16", 1/8" & 3/16" thick For immersion service (regular surfaces)	For the same type of application as GACO N-350-I but for use where it is impossible or impractical to heat-cure the item. The GACO "Cold Bond System."
Gaco N-250-I — Neoprene Putty For immersion or fume service	Fills cavities in castings and smoothes seams before lining with other GACO Products. Excellent for expansion joints.
Gaco N-92 — Neoprene Caulking Compound For immersion or fume service	A 100%-solids caulking compound containing no volatile solvents. Fills deep pits, cracks and cavities with any thickness.
Gaco N-79 — Neoprene Aircraft Coating High tensile and dielectric properties	For coating radar and radio housings and other laminated plastic parts. Resists rain erosion and hail at high speeds.

P-11

TEAR HERE

Send me complete information on the GACO Neoprene Products circled above.

NAME_____

COMPANY_____

ADDRESS_____

CITY & STATE_____

GATES ENGINEERING COMPANY, Wilmington, Del. *The Pioneer Maker of Neoprene Coatings and Linings*

For more facts circle 607 on Reply Card

NEW PRODUCTS

(Begins on page 154)

to assure fast, positive shut-off in the event of electrical failure. Motor and plunger assembly can be removed for servicing the valve without breaking line connections. Position of the diaphragm (open or closed) is shown by an indicator on the motor mounting bracket. Flange mountings, with aluminum companion flanges, are furnished as standard equipment. Eclipse Fuel Engineering Co.

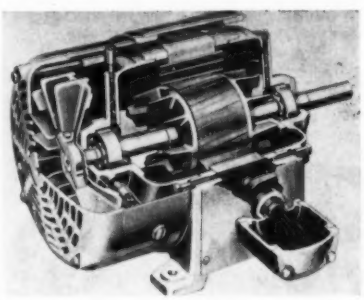
35—PORTABLE MACHINE for cutting holes in masonry

Using a self-sharpening diamond drilling bit the Mechanized Mole is designed to cut holes ½ to 10 in. in diameter through hard aggregate, including steel reinforced

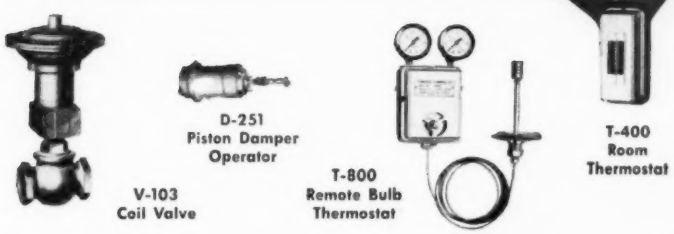
building material, to a depth of 18 in. Deeper holes may be drilled by placing an extension shaft on the bit. According to manufacturer, it takes less than 2 min to drill a 6-in. diam hole in 1 ft of concrete with this machine. It comes in 1-hp and 2-hp models, weighs about 275 lb. Molco Drilling Machines Corp.

36—ENCLOSED MOTOR for the chemical services

Specially designed for chemical services, this totally-enclosed and corrosion protected motor is reported to be suited for dangerous and damaging atmospheres. Motor incorporates specific features for



these services, including a stainless steel stator band surrounding the inner enclosed case; a stainless steel fan cover guard; cast-iron conduit box sealed with a non-deteriorating, impervious com-



C. A. Norgren Co., Englewood, Colorado. Stanley Morse, architect; K. J. Murray, consulting engineer; Bell Plumbing & Heating Co., heating contractor, all of Denver.

One of the most modern manufacturing and office buildings recently constructed in the Denver area is the C. A. Norgren Co. building at Englewood, Colorado.

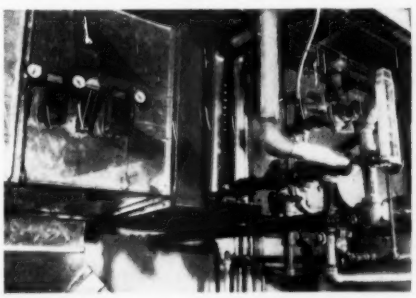
Precision regulation of the heating and air conditioning systems is provided by a specially planned system of Johnson Automatic Temperature Control. The building is heated by radiant panels and convectors. Room by room comfort is assured by strategically located Johnson *Individual Room* Thermostats which operate valves on the water supply to the panels and convectors.

Behind the scenes, other Johnson Thermostats operate Johnson Valves and Damper Operators on the four central fan heating and air conditioning systems which serve the executive, sales and general offices, the engineering department and the lobby area.

All control apparatus is combined in a single "Planned-for-the-Purpose", "Installed-for-the-Purpose" control system resulting in maximum comfort and savings from every heating and cooling dollar spent.

Johnson Automatic Control Systems are always designed specifically for each individual installation. Let a Johnson engineer from a nearby branch office provide the answer to your temperature regulation problems. There is no obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

In the engineering department, Johnson *Individual Room* Thermostats maintain ideal working temperatures by operating convector valves and regulating the supply of conditioned air.



Johnson Thermostats on one of the central fan air conditioning units regulate the fresh air supply and control the temperature of the conditioned air. The thermostatically controlled steam valve provides a constant discharge temperature in the heating season.

JOHNSON CONTROL

TEMPERATURE ⇕ AIR CONDITIONING

MANUFACTURING • PLANNING • INSTALLING • SINCE 1885

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5 reasons for using DAY "AC" (HERSEY TYPE) DUST FILTERS for efficient dust control

DAY Dust Filters are doing an outstanding job in a wide variety of applications. Here are five reasons why so many manufacturers use (and reorder) DAY Dust Filters.

1 **Constant resistance resulting in constant air volumes.**

2 **High pressure reverse jet cleaning of filter tubes gives high air-to-cloth ratio.**

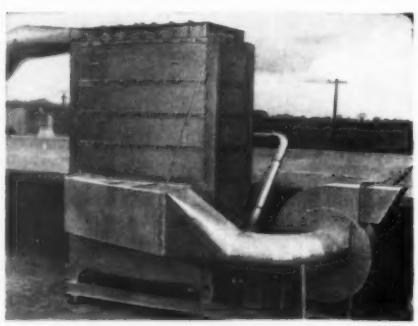
3 **Self-adjusting blow rings assure perfect tube cleaning, giving maximum air volumes at lowest pressures.**

4 **No shut-down to clean. Constant, automatic operation.**

5 **Installation requires minimum space.**

DAY service includes surveying your dust problem, engineering a practical solution, manufacturing required equipment including Exhausters, Cyclonic Separators, Filters, Piping, Fittings, and Hoods required to complete the system. ONE UNDIVIDED RESPONSIBILITY.
If you have a dust control problem, whether it involves a complete dust control system or a single unit, your inquiry is invited. WRITE FOR BULLETIN 528-R.

DAY "AC" Dust Filter installation, Lapp Insulator Company, LeRoy, New York. The company reports —"most of our dust is very fine and varies in size from 1 micron to 25 microns. The DAY Dust Filter solved our dust problem".



DAY SINCE 1881 DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM

The **DAY** *Company*
807 Third Ave. N. E. • Minneapolis 13, Minn.
IN CANADA: P.O. Box 70G, Ft. William, Ontario
Branch Plants: Buffalo, Ft. Worth and Toronto, Ontario
Representatives in Principal Cities

For more facts circle 609 on Reply Card

NEW PRODUCTS

(Begins on page 154)

pound; cast-iron ventilating fan or a cast bronze fan; cadmium plated screws and fittings; elongated bearing caps; and a double-sealed moisture drain. Features also include asbestos protected windings, transverse lubrication and normalized bearings. Designated as Types SD and SE, motor comes in ratings from 3 to 150 hp. U.S. Electrical Motors Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

37—TINY TAPE RECORDER willing to work anywhere

The plant engineer who takes his work home with him can have an electronic assistant at his side with the Midgetape, a pocket tape recorder, only 8½-in. long and weighs 3¼ lb. It costs around $230 including recording cartridge, batteries, crystal microphone and earphone. It is battery operated and cartridge loaded. The magnetic tape is wound inside a

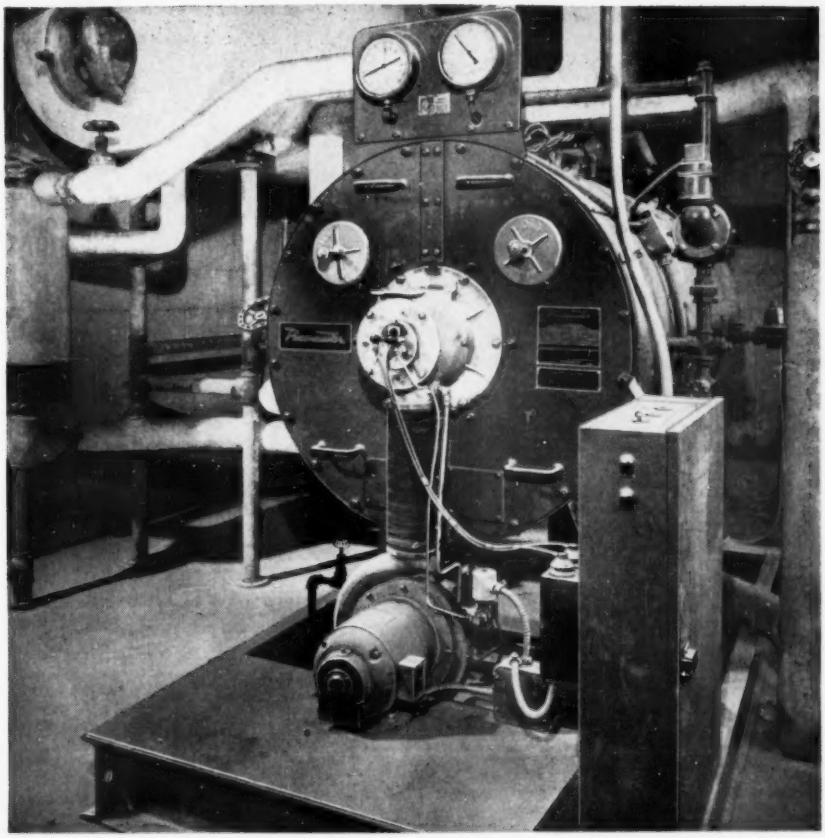
cartridge about the size of a pack of cigarettes and is inserted into the recording—no tape threading is needed.

The Midgetape has only three controls, it is pointed out; it records for an hour on dual track tape and simultaneously erases old material as new recordings are made. It uses hearing aid type batteries which snap fasten into the unit. The batteries are reported to last over 45 hr, and a small red indicating light goes off when the battery has only 2 hr of recording time remaining. The new unit suggests itself for use in conferences, time-study work, contact with field personnel. Optional accessories include carrying cases, two-way telephone recording adapters. Company says the unit will record anywhere—even on cars, trains and planes—and the recording cartridge is mailable. Mohawk Business Machines Corp.

38—BATCH OVENS with gas or electric heat source

Reported especially adaptable for "burn off" in metal preparation for painting and finishing, these batch type ovens have many other uses including baking all new types of finishes, preheating, dry-

in CHEMICAL INDUSTRIES



Powermaster® Saves in Many Ways!

FOR EXAMPLE: The Davison Chemical Corporation's new multi-building fertilizer plant at New Albany, Indiana, is heated entirely by this oil-fired *Powermaster* Packaged Automatic Boiler.

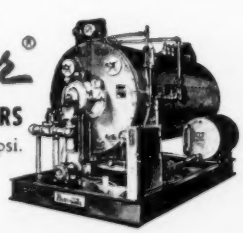
Savings start with *Powermaster's* simplified installation . . . no special foundation or costly stack is required. A factory-assembled packaged unit, fire-tested before shipment, it is delivered complete, ready for operation as soon as fuel, water, electrical and steam connections are made. Other cost-saving *Powermaster* advantages include high fuel economy at all loads, space-saving compactness, dependability, maintenance-saving accessibility, fully automatic operating and safety controls, hospital-clean boiler room and smokeless combustion. *Powermasters* are entirely designed and built by Orr & Sembower, and are rigidly fire-tested before shipment.

Compare *Powermaster* feature by feature, and you'll see why it is so popular for use in industrial plants, institutions, housing projects, hotels, churches, schools, laundries and all types of buildings. Send now for latest bulletins.

O·S *Powermaster*®

PACKAGED AUTOMATIC BOILERS

sizes to 500 HP; Pressures to 250 psi.



ORR & SEMBOWER, INC. • Established 1885 • **Morgantown Road, Reading, Penna.**

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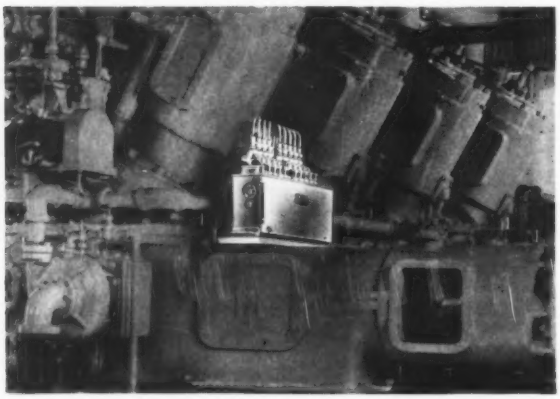
TO KEEP COSTS DOWN

KEEP PRODUCTION UP

WITH MANZEL FORCE FEED LUBRICATION

Pressure Application — Exact Amounts — Accurately Timed

Manzel Force Feed Lubricators insure efficient machinery operation by lubricating automatically. No stops for hand oiling — or because of breakdowns caused by faulty lubrication. They



quickly pay for themselves through savings in down time, labor and lubricants.

These sturdy, dependable lubricators can be installed on new or existing equipment. Write for details.

Manzel

DIVISION OF FRONTIER INDUSTRIES, Inc.
301 BABCOCK STREET, BUFFALO 10, NEW YORK

For more facts circle 611 on Reply Card

NEW PRODUCTS

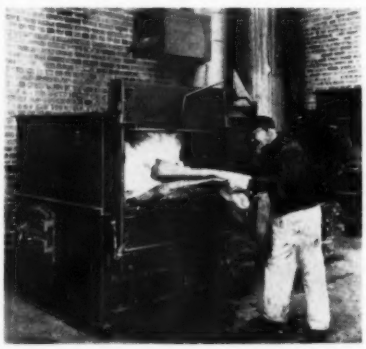
(Begins on page 154)

ing, curing, dehydrating and other types of baking operations. Air circulation is automatic, both horizontal and vertical.

Gas models of these ovens have gas burners with electric push-button ignition and safety pilot. Electric models have Inconel-sheathed heating elements with outside terminals (no wiring exposed to oven temperature, it is pointed out) and are equipped with high and low heat switch. These electric models range from 20 kw to 60 kw and the gas models from 200,000 Btu to 500,000 Btu. The ovens have steel plate floors, insulated panel construction. Grieve-Hendry Co., Inc.

39—PORTABLE INCINERATOR for average dry waste

Although the basic design of this portable incinerator is suited to incineration of dry waste, manufacturer says modifications are readily made for disposal of pathological waste, garbage, and other wet refuse. Capacity of the three standard sizes ranges from 200 to 450 lb per hour. A feature of the new model is an



extra large door that simplifies charging bulky objects such as large boxes and cartons. The door is of the split-guillotine type, counterbalanced for easy use.

Another significant feature announced is the long gas travel provided, with numerous velocity and direction changes for high combustion efficiency. The unit also has a separate settling chamber, permanent steel skids, and a top stack outlet designed to shorten the overall stack length required. The stack, an optional item, is self-supporting. The incinerator has a steel casing, monolithic refractory lining. Full data is provided in Form 65. Plibrico Co.

40—PROCESS TIMER features single-knob control

Designated the TSA-21, this process timer is reported to control the timed simultaneous closing of one electric circuit and opening of another. Industrial applications include moulding presses, machining tools, and automatic mixing operations. In addition, power distribution equipment frequently requires pre-

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● Nalco Representatives make friends and permanent Nalco System users with a simple formula: honest water treatment service.

You can ask your Nalco Representative questions and get straightforward answers . . . And if you stump him, he—and you—can put the whole Nalco Laboratories' and Service staffs to work on a plain-language plan of action to get you better water treatment results, most economically.

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Nalco WATER TECHS

A paper on "A Laboratory Method for the Study of Steam Condensate Corrosion Inhibitors," presented at the 8th Annual Conference, National Association of Corrosion Engineers, has been reprinted by Nalco for distribution to men interested in this problem. Your copy will be sent free upon request.

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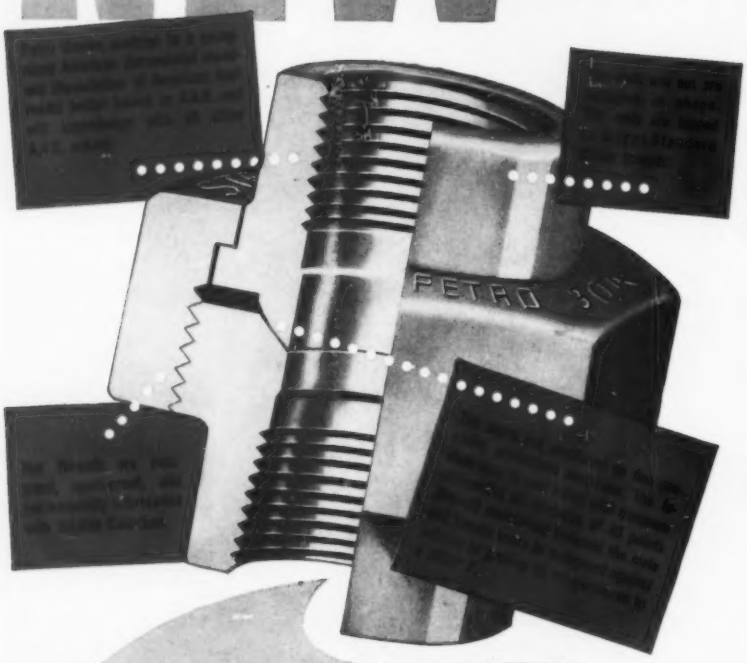
NEW FORGED STAINLESS STEEL

SCREWED OR SOCKET WELD



PETRO 304

A combination of the famous Petro A.A.R. features, hot forging from stainless steel bars and electro polishing to a clean, bright surface has produced these new stainless steel unions that are superb for use on all processing lines where stainless steel is required.

PETRO DUAL

These new unions with stainless steel hub ends and Udylited carbon steel nuts have been developed to provide top performance on all services where atmospheric corrosion is not a problem.

PETRO 316 and PETRO 347

These stainless steel unions (available with either stainless or carbon steel nuts) can be furnished on special order.

SIZES ¼" THRU 2", PRESSURES 900 LBS. S.W.P., 3000 LBS. C.W.P.

ORIFICE TYPE UNIONS ARE ALSO PRODUCED IN STAINLESS STEEL.

WRITE DEPARTMENT C

For additional information or refer to listings in the Composite or Refinery Catalogs.

ORDER BY TRADE NAME FROM YOUR LOCAL JOBBER

CLAYTON MARK & COMPANY

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NEW PRODUCTS

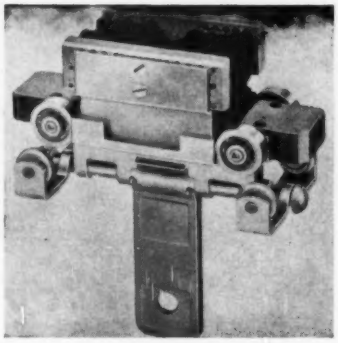
(Begins on page 154)

cision control for starting automatic substation equipment, and for reclosing of automatic circuit breakers. Announced as ideal for equipment which requires easily adjustable and accurately timed operations from an initial impulse, the TSA-21 includes one set of time-opening main contacts and one set of electrically separate time-closing main contacts. The trip point of the main contacts can be adjusted by an external knob, and each timer has a set of instantaneous contacts for use independently or as hold contacts for timer solenoid. General Electric Co.

41—CLEANING TOOLS for servicing busway systems

Trolley mounted cleaning tools are introduced for servicing of this company's busway electrification systems. It is pointed out that periodic cleaning is important in atmospheres where floating particles — lint, dust, paint spray — may adhere to the surfaces of the bus bars. Such accumulation may cause electrical leakages as well as arcing and subsequent pitting of contact surfaces.

The new tools include a dust remover



(shown) and a bus bar cleaner. The former uses stiff durable bristle brushes for removing the lint and dust from the bus bars. The cleaner has abrasive cleaning stones to remove any pits or arc marks, at the same time polishing the bus bars. The tools are inserted through the door track section, with the power off, and simply pulled back and forth along the length of track. Their frequency of use will depend on the severity of accumulated foreign matter. Bulletin 41 gives details. Feedrail Corp.

42—TEMPERATURE CONTROLLER is compact, low priced

The Series 540 is announced as a remote indicating temperature controller — in the $75 price range — which is accurate within 1 per cent of full scale under most conditions. This compact controller is designed for economical yet accurate temperature control in ovens and processing equipment of all types. It has a temperature operating range of 100 to 700 F and may be flush or surface mounted.

IN ONE MINUTE'S TIME

AWS Class E-6012 electrode produced this fillet

THIS MUCH MORE WELD

was made in the same time in the same steel plate

Actual length of welds: E-6012 — 5-1/16", Easyarc 12 — 12". Current settings: 230 amps AC for E-6012; 275 amps AC for Easyarc 12. Both welds made in 1/4" plate with 3/16" dia. electrodes.

with the new

AIRCO®

EASYARC 12

Airco's new EASYARC 12 actually welds mild steel in about half the time it takes with conventional AWS Class E-6012 and E-6013 electrodes. EASYARC 12 has a completely new type of flux coat that contains a high proportion of powdered metal. This lets you use higher currents without breakdown of the coating, and vastly increases deposition rates, since the flux itself adds metal to the weld.

Besides being fast, EASYARC 12 is far easier to handle. Welds are made by "dragging" the electrode along the joint. Spatter is almost negligible. And EASYARC 12's slag is practically self-cleaning.

For complete information and prices — get in touch with your Airco office or dealer right now.

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Fyr-Fyter

DRY CHEMICAL EXTINGUISHERS

Reach for Fyr-Fyter Dry Chemical Extinguishers . . . with absolute assurance of protection performance! They're engineered to PERFORM with "Sealed-In" power that's harnessed in perfected air-tight, water-tight sealing to provide fast, positive, fire-fighting action . . . *without fail!* The simple, squeeze-grip nozzle control releases a thrust of force that's SURE . . . expelling a long-range, heat-shielding, flame-smothering stream of free-flowing chemical powder. On contact, the flame-smothering powder puts out fires in gasoline, petroleum products, paint, varnish, lacquer, turpentine, alcohol . . . *all flammable liquids, gas, butane, propane, chemical and electrical fires!* Stainless steel tank and aluminum castings provide extra strength for more rugged use, and less weight for easier handling.

For assured protection performance . . . be SURE with an Underwriters' Approved Fyr-Fyter Dry Chemical Extinguisher!

WRITE ON YOUR LETTERHEAD FOR FULL DETAILS TODAY!

FF-5

The Fyr-Fyter (FIRE) (FIGHTER) Co.

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BRANCH OFFICES: *New York, Boston, Philadelphia, Chicago, Atlanta, Dallas, San Francisco, Portland, Seattle.*

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NEW PRODUCTS

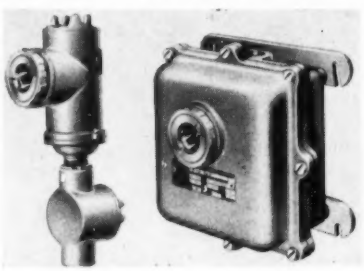
(Begins on page 154)

Principal features of the new unit include: a double-pole, double-throw power relay rated for 15 amp, 115 v integral with the case; an adjustable differential that can be varied between 0.8 and 4 per cent of scale range; temperature setting pointer and bulb temperature pointer which pivot on the same axis and indicate against the same scale face. This last feature makes it possible to compare actual vs set-point temperatures from a considerable distance from the indicator, without having to read the dial.

The new controller operates on a liquid-filled bulb and capillary system with response to temperature change transmitted to a bellows assembly and then to the indicating pointer through a simple mechanical linkage. Control temperature is set with an adjusting knob on the front panel. Fenwal Inc.

43—AUTOMATION CONTROLS for hazardous locations

A system of explosion-proof Condulets consisting of light source transmitter and photoelectric tube receiver, is reported to enable automation techniques to be used at hazardous areas. The system is designed to automatically activate or turn off lights, start or stop motors, total assembly line output, or control other electric or electronic devices. Whenever the appearance or absence of light is

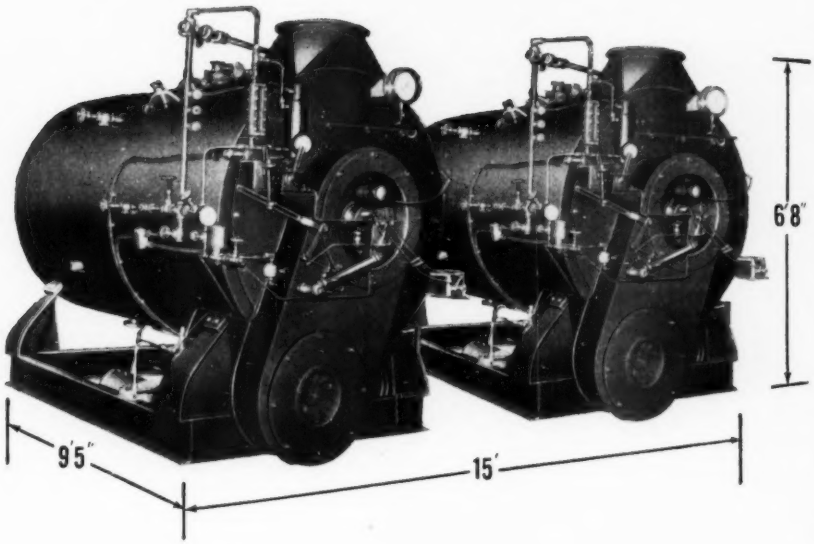


detected through a lens by the receiver's photoelectric tube, a relay opens or closes the electrical circuit.

The light source transmitter housing is cylindrical, and has a threaded adjustable focusing ring with converging lens and outer explosion-proof window. Lens focal limits are given as from infinity to within 6 in. from the lens. Inside the housing a 6-v auto lamp provides the light source. From the receptacle terminals, flexible leads extend through a seal to the junction housing where — through a threaded cover — they may be reached for splicing.

The receiver consists of a phototube receiver with lens, photo-tube, thyratron, electronic amplifier and load control relay. It is pointed out that the unit is explosion proof and classified for use at Class I Group D hazardous locations by Underwriters' Laboratories. The unit is furnished with a cast ferraloy cover and housing. Crouse-Hinds Co.

9600 lbs. of Steam in only 1000 cu. ft!



Using only 140 sq. ft. of Floor Space

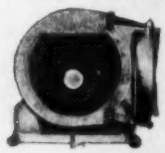
The Cyclotherm MC4000 Steam Generator allows you to utilize your space more efficiently . . . to devote more of your area to storage and production use.

Requires the minimum in boiler room space and costs. Or can be placed in a working area because radiant heat loss is at a minimum. Exclusive, patented, Cyclotherm Cyclonic Combustion makes the most compact steam-generator yet developed possible.

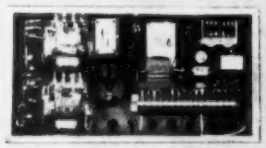
A flaming cyclone swirls the length of the firetube . . . separated from the walls only by a thin layer of air. The even distribution of the flame converts the entire surface of the firetube into an effective heating area. Without increasing the boiler size, the heating area has been enlarged to the maximum.

No other method of combustion can equal this accomplishment. The Cyclotherm MC4000 is ideally suited for service wherever steam is needed but boiler room space is at a premium.

Exclusive, patented Cyclonic Combustion gives you a minimum guaranteed 80% efficiency in only 2 passes . . . a rate unequalled by any other method of combustion.



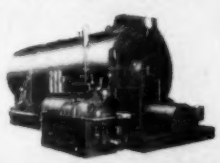
Simplified design shaves maintenance costs up to 50%. Cleaning and replacement of parts can be done in minutes by any maintenance man. Firetube never needs cleaning as all fuel is consumed.



Automatically operates by electronic control system. No fireman required. Burns gas and/or oil. A Cyclotherm unit will pay for itself in 4½ years in fuel savings alone.

Precision modulation equipment regulates firing rate from 30 to 100% of the Cyclotherm's capacity without losing peak efficiency.

Now aboard Sinclair Refining Co.'s "Sinclair Chicago," and U.S. Navy's "U. S. S. Endurance" . . . operating efficiently in space too cramped for ordinary packaged units.



Other Cyclotherm models range from 18 to 500 hp . . . from 15 to 200 psi. For industrial, commercial plants, institutions and marine use.

YEARS AHEAD IN STEAM GENERATION
CYCLOTHERM®
STEAM AND HOT WATER GENERATORS

See Cyclotherm's new MC4000 Steam Generator at the
CYCLOTHERM EXHIBIT
Booth 450, 21st Power Exposition, Philadelphia, Dec. 2-7

Cyclotherm Division, U. S. Radiator Corp., Dept. 341, Oswego, New York

For more facts circle 616 on Reply Card

How to have clear telephone service... even in the middle of the proverbial "BOILER FACTORY"!

GAI-PHONE... *the wonderful new electronic telephone for noisy areas*

(pronounced GUY-phone)

EVER TRY to talk to your chief engineer while he checked meters at a generator? Or to your production manager while your biggest and noisiest machinery ran full-blast? Such a situation *could* be no problem at all, if your man were talking to you on a GAI-PHONE.

This ingenious electronic telephone—using some vacuum tubes, rectifiers and other devices in its special base—actually creates a *Zone of Quiet* around the user's head. His voice comes through clear as a bell, but the extraneous noise is effectively suppressed. What's more, he can adjust *his* telephone so that your conversation is clearer and the annoyance of side-tone is reduced.

Best of all—it's all much less expensive than building sound-proof booths or such. Let us tell you more—send coupon today.

STROMBERG-CARLSON®

TELEPHONE DIVISION • ROCHESTER 3, N. Y.

Please let us have more information on your GAI-PHONES, for use in noisy areas.

FIRM .....

ADDRESS .....

.....

SIGNED .....

For more facts circle 617 on Reply Card

Rotary Pumps . . . II

(Continued from page 128)

These facts are particularly true of the handling of extremely viscous fluids and although most engineers dealing with fluids of this type are conscious of what can be done, it is surprising the number of installations encountered where considerable savings could have been made if a little more study had been made initially.

A question frequently asked is, "What is the efficiency of a rotary pump?" Efficiency is dependent on practically all of the factors already discussed such as size of pump, rotative speed, viscosity, and pressure differential. It can be calculated for any specified set of conditions but will vary with any change in these conditions.

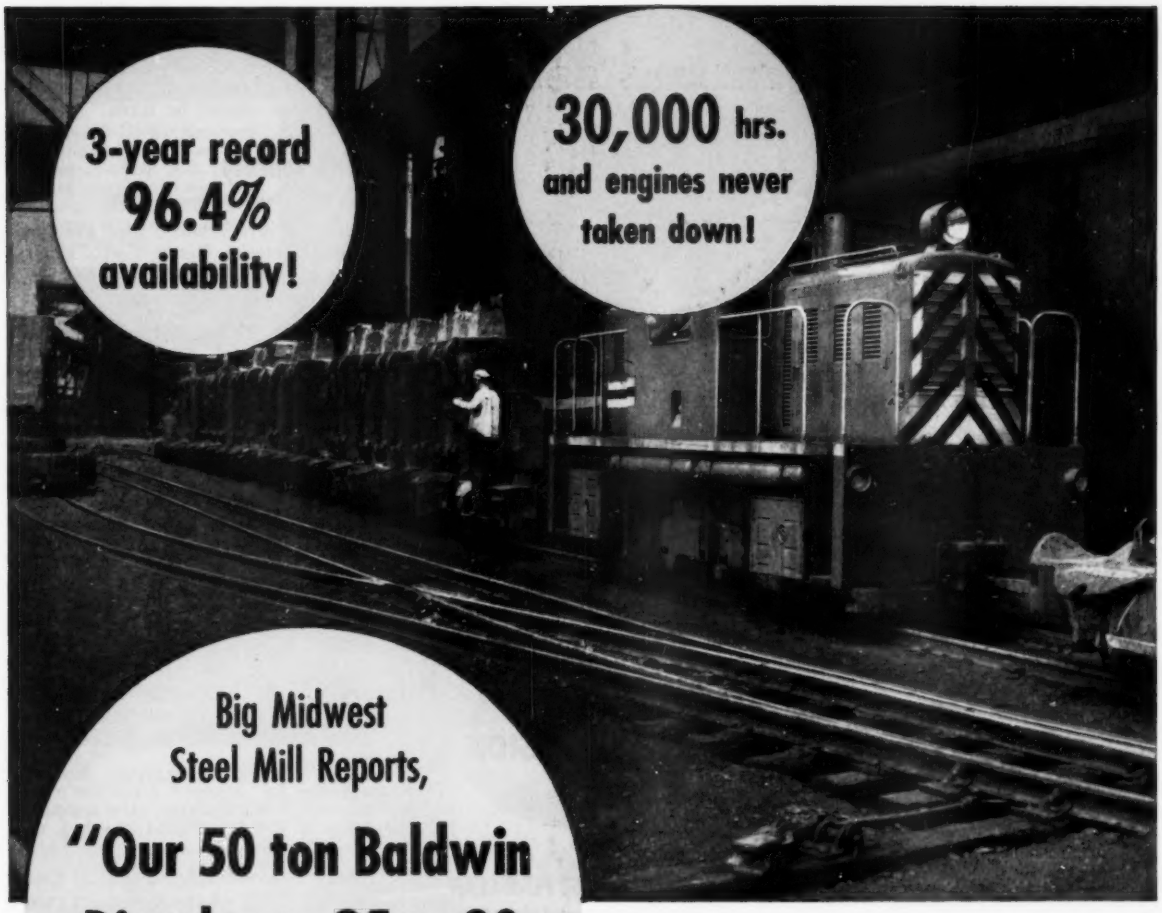
Sometimes an attempt is made to calculate the efficiency on the basis of guaranteed capacity and brake horsepower; this is satisfactory provided that both were figured on the same viscosity. Normally, however, where rotary pumps are used a viscosity range has been specified or assumed, the capacity guaranteed on the minimum viscosity and the brake horsepower on the maximum. If these figures are used in an attempt to calculate efficiency a false value will result.

Good efficiencies can be obtained if a pump is properly selected to meet one set of conditions only. For example, medium size pumps of about 50 to 100 gpm capacity operating against 100 psi discharge pressure, normally have efficiencies of about 70 to 80 per cent. Higher pressure pumps of about the same capacity, selected for optimum conditions, will give as high as 85 to 87 per cent.

In selecting a pump, the kind of fluid to be handled must also be taken into account. Due to the fact that rotary pumps depend upon close clearances for proper pumping action the handling of abrasive fluids will usually cause rapid wear.

Over the last twenty-year period great progress has been made in the design and application of rotary pumps and further progress is being made constantly. Pumps of this type are available for the handling of fluids ranging from aviation gasoline and water to semi-plastics, such as cellulose products, chilled shortening and greases. Where required, extremely high vacuum, pressures and speeds are possible and practical.

If complete information is given as to suction conditions, viscosity, air or gas entrainment, discharge pressure etc., so that a proper pump selection



Big Midwest Steel Mill Reports,

"Our 50 ton Baldwin Diesel gets 25 to 30 heats out on time every day!"

When it costs hundreds of dollars for every delay of a minute in getting a heat out and the ingots to the blooming mills and soaking pits, efficient, dependable locomotives are indispensable to a steel mill. A major steel mill in the midwest reports a remarkable record of money-saving performance by their Baldwin industrial diesel-electric locomotive:

"Our 50-ton Baldwin replaced two steam locomotives on the hot line moving ingots to the blooming mills and soaking pits. We tap 8 to 10 heats a shift, three shifts a day. The heats run as much as 150 tons, making many of the loads for the Baldwin 594 tons which theoretically would require a 32% heavier diesel. But this Baldwin has handled *every* job 24 hours a day for over 3 years in spite of the extreme heat, bad curves and rough track conditions on this run. It is taken off the job each week two hours for inspection and lubrication. No major repairs have been necessary during 30,000 hours of operation."

In mine or mill, you, too, can depend on similar economy and dependability by switching to and with Baldwin Industrial locomotives.

BALDWIN · BLH · LIMA-HAMILTON

BALDWIN – LIMA – HAMILTON

INDUSTRIAL LOCOMOTIVES

For more facts circle 618 on Reply Card

tomorrow's transmission
TODAY!

PLAN-GEAR PGT TRANSMISSION

AS SIMPLE TO OPERATE AS AN ELECTRIC MOTOR

Anyone can easily operate the new **PGT compound planetary transmission** by merely moving a single hydraulic control lever. With two forward and one reverse speeds, instantaneous selection is possible because the cushion shift action of the **PGT** prevents shock loading. Shift is made from full speed forward to full speed reverse in only 1½ seconds.

CONTROLLED BY HYDRAULIC PRESSURE

The **Plan-Gear Transmission** has two planetary gear assemblies for low and reverse and a multiple disk clutch for direct drive. The planetaries are actuated when hydraulic pressure contracts a band around an anulus or drum to provide the desired movement. A built-in oil pump provides pressure for actuating controls, lubrication, and flow to the torque converter.

The simply designed, sturdily built **Plan-Gear Transmission** has been tested exhaustively and successfully in the field as well as in the laboratory, and has proved superior to other more complex transmissions. If you have need for a transmission with 150 pound-feet continuous input torque, we'd like to discuss the matter with you. Write today for further information.

PGT-150 PLAN-GEAR compound planetary transmission

is rated at 150 pound-feet continuous input torque; self-lubricated, constant duty, for use with torque converter. Standard ratios: high, 1:1; low, 3:1; reverse, 3.2:1; optional reverse, 2.23:1.

Suggested Uses:

- Front end loaders
- Lift trucks
- Earth movers
- Hoists and cranes
- Car pullers
- Slushers
- Machine tools
- Conveyors
- Power take-offs
- Truck mixers

Designed and built exclusively by

AMERICAN GEAR & MFG. CO.

New Avenue, Lemont, Illinois
Phone: Lemont 920

Subsidiary of BRAD FOOTE GEAR WORKS, INC., Cicero 50, Illinois

For more facts circle 619 on Reply Card

can be made, and the proper attention is paid to installation features particularly on the suction side, there is absolutely no reason why a satisfactory installation cannot be made.

News Roundup

(Continued from page 105)

Pleski, Willys Motors, Inc. Fred M. Reibin, General Metals Corp., Enterprise Div., was appointed Chairman of the Membership Committee.

Philadelphia

The Plant Engineers' Club of Philadelphia, an affiliate of the American Institute of Plant Engineers, will act as host for the 21st National

D. P. West, plant engineer, Simonds Abrasive Co., discusses plans for meeting with J. M. Waligora, chief engineer, Sharp & Dohme, Div. of Merck & Co.

Power Exhibition, to be held at Convention Hall, Philadelphia, from December 2 to 7.

Arrangements have been made for a dinner to take place on Thursday, December 2, at Convention Hall.

How to Make a Flag Pole

(Continued from page 80)

tend the foundation 6 in. above the grade to prevent wet grass contacting the pole.

Let the concrete set several days. Start the rope through the pulley making both ends fast at the scaffold. Screw on the ball and start pulling the 2 in. pipe upward, painting as you go. The pipe weighs only 70 lb.

When the 24 in. mark appears at the top of the reducer, weld the pipe and reducer together.

Make clamps of pieces of 2 by 4 with holes to fit the pipe to be lifted. Attach the chain block to the clamp and start raising again, painting as you go. When the four holes in the 3 in. pipe appear you should be able to see the coupling inside. Weld the coupling to the pipe through the holes and build up level with the exterior of the pipe.

Repeat this operation until the 4 in. coupling is welded to the 5 in. pipe.

For more facts circle 620 on Reply Card ——→

Black & Decker Hammers have hundreds of time-and-money-saving uses, piercing concrete to install machines and power lines, as here, or *wherever* impact is called for.

Black & Decker
ELECTRIC HAMMERS GIVE
MORE POWER TO YOU
to save time
...cut costs!
To DRILL DIG PIERCE BREAK
To CHISEL GOUGE CHANNEL NOTCH
To CHIP PEEL POINT CAULK
To BATTER SHAKE SHATTER SMASH
To do HUNDREDS of JOBS in INDUSTRY FASTER, BETTER, CHEAPER!

See where B&D Hammers save you time and money!

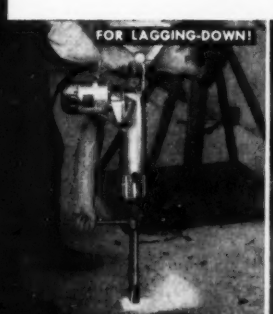
New Book shows how!

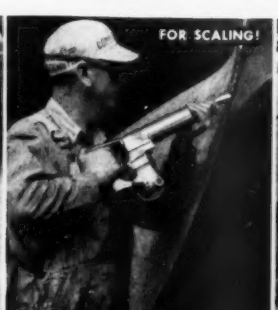
From drilling in concrete and lagging-down machines to chiseling castings and holing-through walls, B&D Electric Hammers get more jobs done faster, better, cheaper! No other hammer has so many features for comfort and safety. No other hammer gives you so much working power in so little weight at such a low price! Get all the facts! Get this great B&D Hammer Handbook *free!* Page after page of on-the-job photos show how you can save time, cut costs on dozens of jobs in your own operation! Write to: The Black & Decker Mfg. Co., Dept. 1511, Towson 4, Md. Meanwhile, ask your B&D distributor for a demonstration!

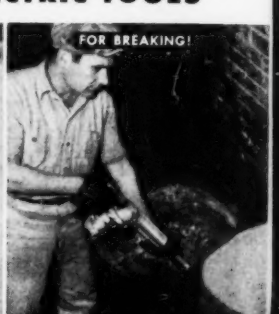
For nearest distributor, see "Tools-Electric."

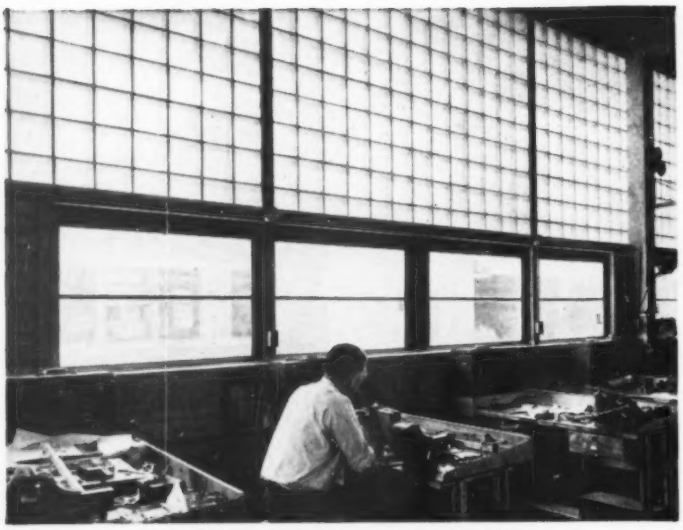
LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS





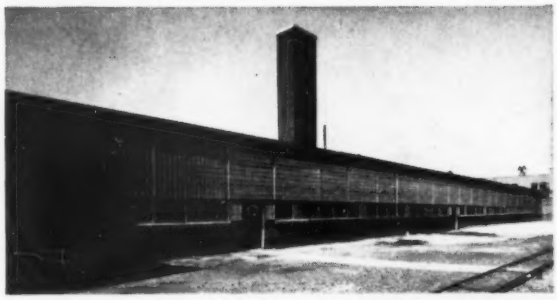




Haughton Elevator Company, Toledo, Ohio
Bellman, Gillett and Richards, Architects
J. H. Berkebile & Sons, Contractors

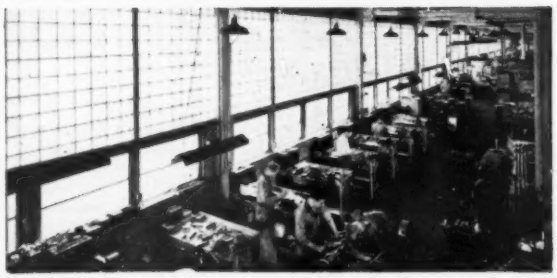
How OWENS-ILLINOIS GLASS BLOCK* solved a maintenance problem while providing better light

BEFORE GLASS BLOCK
the building was daylighted by single-glazed, wood sash, presenting both costly maintenance and daylighting problems.



AFTER GLASS BLOCK
maintenance costs tumbled. Glass block can't rust, rot or corrode . . . are hard to break.

BEFORE GLASS BLOCK
the wooden sash with clear glass offered no daylighting control, glare was a problem.



AFTER GLASS BLOCK
eye-straining glare is eliminated. Light-Directing Glass Block plus vision strip keep brightness at comfortable levels, provide vision and ventilation.

The Haughton Elevator Company is typical of many buildings now faced with two problems: 1) What to do about worn-out window sash and 2) how to control and make better use of free daylight. How Owens-Illinois Glass Block solve both problems is told in the pictures and captions.

When workers must operate to extremely close tolerance, Owens-Illinois Light-Directing Glass Block provide an extremely effective daylighting system. Daylight is directed upward and diffused over all parts of the room all day long. It's almost as if your building "turned with the sun."

For more information how sash replacement with Owens-Illinois Glass Block can cut your maintenance costs and provide better light while doing it, write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. **PE11**, Toledo 1, Ohio.

Formerly known as INSULUX

OWENS-ILLINOIS GLASS BLOCK
AN (O) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

For more facts circle 621 on Reply Card

NEW BOOKS

for the plant engineer

Deaerating Equipment

STANDARDS AND TYPICAL SPECIFICATIONS for Deaerators and Deaerating Heaters. Third edition; size 11 by 8½ in.; 11 pp; paper bound. Published by Heat Exchange Institute, 122 East 42nd St., New York 17, N. Y. Price $1.00.

MATERIAL in this edition has been generally revised and rearranged. A new table presents storage capacities in minutes and cubic feet for rated capacities from 10,000 to 1,600,000 lb per hr.

The booklet contains charts giving the flow through water inlet regulating valves of various sizes versus pressure drop. Diagrams have also been added to show typical arrangements of deaerating units.

Included in the information offered is a temperature-pressure conversion table covering temperatures from 140 to 212 F. This is in addition to a pressure-temperature conversion table for pressures from 0 to 125 lb gage.

As a further aid, the book contains a specification for deaerating units.

Stream and Air Pollution

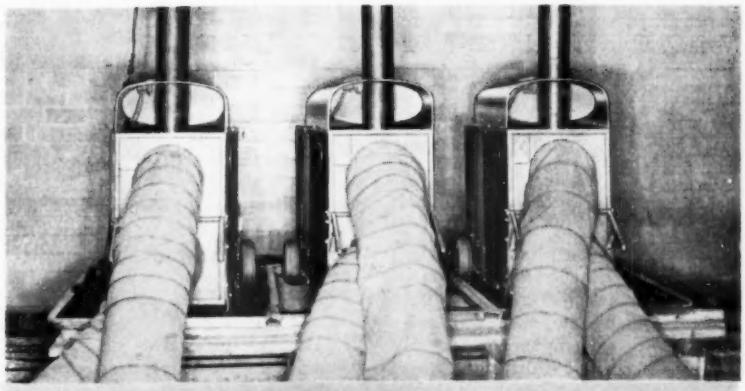
WATERBORNE AND AIRBORNE Wastes Symposium. Size 11 by 8½ in.; 16 pp; stapled sheets. Published by the Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y. Price $2.00.

THIS SYMPOSIUM includes papers that were presented at the April, 1954 meeting of the Association of Consulting Chemists and Chemical Engineers.

The author of one paper entitled, "Waterborne Wastes— Past, Present and Future." is Harry A. Faber, Associate Editor, of "Water and Sewage Works." In this paper he touches upon the increasing needs of water coupled with population growth. He considers the expenditures over recent years in sewage and industrial waste treatment. He gives attention briefly to the industrial stream pollution problems and suggests how they should be approached.

William G. Christy who is a consulting engineer presented the second paper in this symposium. This is entitled, "Control of Air Pollution." He gives in this paper a general idea of air pollution and its problems. He mentions some figures giving per capita damages from pollution in a few major cities. This is followed by the per capita expenditures of some cities.

Eight pages of the symposium cov-



A battery of three Herman Nelson De Luxe Model Portable Heaters, used to provide emergency heat at the Sunbury Electric Station in Pennsylvania while repairs were underway.

Why does Herman Nelson outsell all other portable air heaters?

***Because:** indoors or outdoors, Herman Nelson Portable Air Heaters are best for any job.*

HERE ARE THE FACTS! Complete safety indoors . . . clean, fume-free, heated air in the working area, with all dangerous gases vented outside!

Maximum efficiency outdoors . . . with flexible canvas ducts channeling heat right to the spot where you need it!

More than 30,000 Herman Nelson Portable Heaters are in use today. Whether you buy, rent, or lease, you'll get the best deal if you see your Herman Nelson Distributor first. FLEET OPERATORS: Ask about our Fleet Users' Replacement-Leasing Plan . learn the *extra* advantages in standardizing on Herman Nelson!

AAF herman nelson

HERMAN NELSON

Best Known Name In

PORTABLE AIR HEATERS

DIVISION OF AMERICAN AIR FILTER CO., INC
MOLINE, ILLINOIS

FREE! MONTHLY WEATHER FORECASTING SERVICE
Better than 85% accurate over the past three years!

HERMAN NELSON
Division of American Air Filter Company, Inc.
Dept. 82, Moline, Illinois
Please send me your monthly weather forecast chart, with no cost or obligation to myself.
☐ We are in the market for a portable air heater. ☐ We are not in the market, but would like information for our files.
NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

For more facts circle 622 on Reply Card

erage are devoted to the floor discussion on stream and air pollution.

Structures

ELEMENTS OF STRUCTURAL ENGINEERING by Ernest C. Harris. Size 9 by 6 in.; 505 pp including index; illustrated; cloth bound. Published by the Ronald Press Company, 15 East 26th St., New York 10, N.Y. Price $7.00.

INFORMATION on a branch of engineering that normally falls within the realm of civil engineering has been slanted by the author for use by various types of engineers.

The book contains material that is useful to engineers in industrial plants. It deals with structural supports for conveyances such as cranes, hoists and conveyors. An entire section is devoted to the analysis of moving loads. Consideration is also given to the analysis of trusses and bracing in another chapter.

Besides giving attention to analyses, the author devotes a large portion of the book to design work involving steel, concrete and timber.

The appendices contain tabulated data which include properties and dimensions of rolled steel sections, live loads for warehouses, properties of lumber, welding symbols and allowable unit stresses for normal loading conditions.

On Controlling Quality

QUALITY CONTROL by N. L. Enrick. Second enlarged edition; size 9 by 6 in.; 181 pp including index; cloth bound. Published by the Industrial Press, 148 Lafayette St., New York 13, N.Y. Price $4.00.

NEW TEXT MATERIAL, tables and charts make this edition about 60 pages larger than the previous one. With the exception of two sections, which are not unduly difficult to understand, the author shies away from mathematical complications in his presentation. The book stresses applications and methods instead. Its content as well as the simplicity of presentation makes it a useful publication not only to students but to practical men.

Among the 19 chapters in the book are the following: Fundamentals of inspection; installing process inspection; tolerances and allowances in interchangeable manufacture; mass production gaging; management aspects of quality control; control charts for per cent defective product. In addition to this, the book includes a list of technical terms and their equivalents used in quality control work.

Legal Aspects

ENGINEERING CONTRACTS AND SPECIFICATIONS by Robert W. Abbett. Third edition; size 8⅜ by 5½ in.; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $6.00.

IF AT TIMES you are confronted with legalities involving contracts and specifications, here is a guide that could make your work easier. The author of this book is an engineer with extensive experience in contract work dealing with government projects.

Over 50 per cent of the book has been rewritten with a 30 per cent increase in material since its first publication in 1945. The method of writing contracts and specifications is stressed in this work instead of what should be written in them. Contracts and specifications samples in this book are not to be considered as standards but are presented for illustration purposes. The book goes into the explanation of various types of contracts as well as different kinds of insurance protection.

Among the 17 main sections are the following: business and professional relations in engineering; sales, real property, mechanic's liens; bidding procedure; surety bonds, prequalification of contracts; technical provisions of the specifications; and litigation, equity, arbitration.

STOP RUST
STOP RUST
STOP RUST
STOP RUST
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STOP RUST
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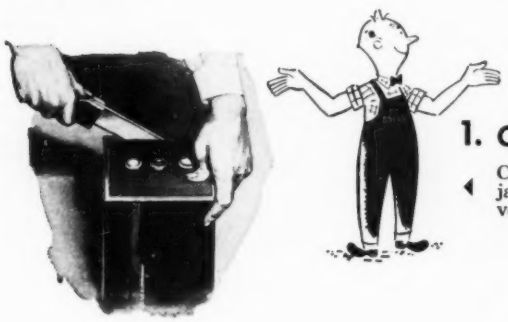
STOP RUST
STOP RUST
It's Hot-Dip Galvanized
Large Pennsylvania coal processing plant chooses Hot-Dip Galvanized Grating for their catwalks and stairs. Constantly exposed to industrial atmosphere, these steel items would soon rust and become unsafe if not protected. After all other coatings had been carefully studied, Hot-Dip Galvanizing was chosen. Here's why: With Hot-Dip Galvanizing you get the thickest, most uniform coating with no open pores to let rust begin—thus costly maintenance is reduced to a minimum and necessity for replacement is eliminated. The original cost of Hot-Dip Galvanizing is economical too.
Safety is also a prime factor to be considered. Since Hot-Dip Galvanizing is performed after fabrication, there is no chance of any portion of the product to be exposed. Complete coverage means complete protection.
When you have a rust problem choose Hot-Dip Galvanizing—the best rust protection you can buy. For the best in galvanizing, send your products to a member of the American Hot Dip Galvanizers Association—he has the know-how to give you a top quality job.
STOP RUST
Send today for our new booklet "Stop Rust." It gives you the full story on the process, plus a comprehensive coating comparison chart. "Must It Rust" 16 mm film available for showing.
AMERICAN HOT-DIP GALVANIZERS ASSOCIATION
1506 FIRST NATIONAL BANK BLDG., PITTSBURGH 22, PA.
For more facts circle 623 on Reply Card

BATTERY MAINTENANCE TIP #2

from the GOULD Plus-Performance Plan

BEST WAY TO REMOVE ELEMENT FROM JAR

When accidental damage requires installing an element in a new jar, the element complete with cover must be removed. The Gould Plus-Performance Plan shows you how this can be accomplished easily and with safety.



1. *Cut Bond Between Cover and Jar*

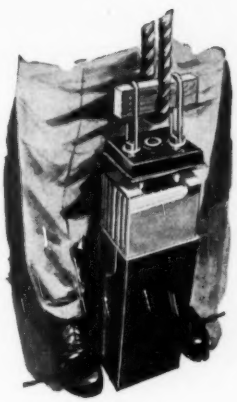
Cut the compound from around the top of jar, using warm compound knife, keeping it very close to inside of jar wall.

2. *Heat Outside of Jar Before Pulling*

To make sure there is no hardened compound to restrain the pulling of the element, heat the outside top of all four sides of the jar with a blow torch. Warm thoroughly, but do not melt or burn the jar.

3. *Pull Element from Jar*

Using Gould Jar Hold Down Clips (Part No. 2-1445) and Gould Cell Puller (Part No. 77061) as shown here, lift element halfway out of jar. Allow element to drain for minute or two, then remove and place immediately in new jar or lay it on flat insulated surface such as wood, for servicing.



GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting | For Mine Shuttle Cars and Locomotives | For Electric Industrial Trucks | For Diesel Locomotive Starting | For Standby and Emergency Power

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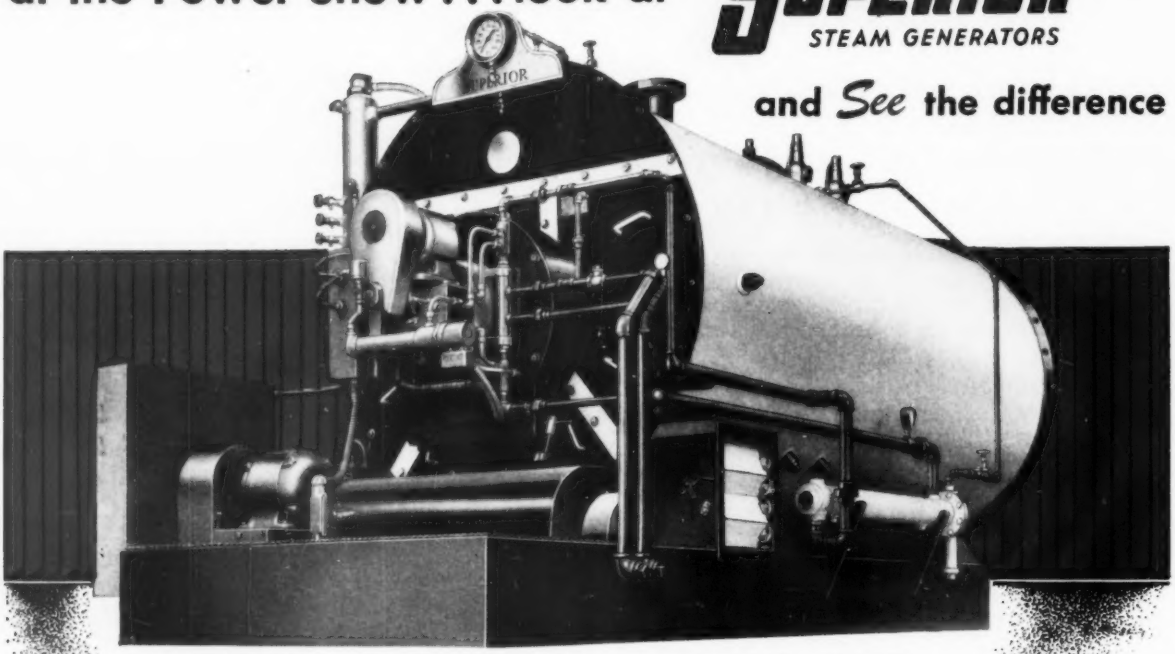
at the Power Show . . . look at SUPERIOR STEAM GENERATORS

and *See* the difference



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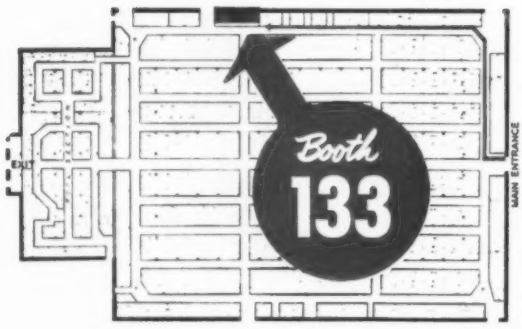

COMMERCIAL MUSEUM
PHILADELPHIA

Look . . . at Superior's 4-pass fire-tube design . . . ample heating surfaces with a minimum of 5 sq. ft. per b.h.p.

Look . . . at Superior's built-in multiple induced-draft fans . . . drawing evenly across the entire tube area, and eliminating the need for an expensive chimney.

Look . . . at Superior's Rotary Burner with its own fan supplying primary air . . . fully automatic with oil or gas, or both . . . change from either fuel to the other quickly, without dismantling equipment or interrupting steam supply.

Look . . . at Superior's safety features . . . induced draft which prevents the escape of combustion gases into the boiler room . . . fool-proof combustion gas pressure-relief port . . . constant gas pilot throughout gas firing periods . . . dual purging of all gas passages, both before and after firing.

Look . . . at the overall picture . . . a complete packaged steam plant. One purchase shipped completely assembled after factory test to assure dependable operation at a guaranteed thermal efficiency of more than 80%.

Look . . . at Superior's catalog for the complete story. If you're not going to the show, write for Catalog 605.

for performance you can **BANK** *on*

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BULLETINS

(Begins on page 23)

153 Super Alloys—This 20-pp brochure describes and gives physical properties and processing data on super alloys — high strength heat and corrosion resistant materials. Included are notes on the uses and characteristics of some super alloy grades, tables and charts illustrating the properties of these materials, and forms in which they are available. Universal-Cyclops Steel Corp.

154 Nickel Alloy Steel—Bulletin A-68, 36-pp, includes more than 70 mechanical property charts showing the tensile and impact properties which may be regularly expected in the quenched and tempered nickel steels in different sizes. General characteristics of each type are briefly described as an aid in the selection of steels for particular applications. The International Nickel Co., Inc.

155 Heat-Resistant Alloy—A new high temperature alloy, NA22H, is the subject of this folder. Various uses of the alloy, which will withstand operating temperatures up to 2200 F, are described. Includes chart which compares high temperature properties of NA22H and other heat resistant alloys. National Alloy Div., Blaw Knox Co.

156 Alloy Sheathing—Technical Bulletin 205 discusses the possibilities of tellurium alloy as a sheathing material, based on extensive tests of the material under various physical conditions. Includes photos and graphs of test results. John A. Roebling's Sons Corp.

157 Cast Irons—Bulletin A-115, 16-pp, tells how to increase usefulness of cast irons and improve the properties by alloying and heat treatment. For easy understanding a glossary of terms is included. Bulletin contains 13 charts, 11 tables. The International Nickel Co., Inc.

WELDING

158 Welding of Stainless Tubular Products—Technical Data Card 162 outlines the welding characteristics of both austenitic and ferritic grades of stainless steels and discusses the question of proper joint design. In addition, it briefly describes various methods such as: fusion, metallic-arc, oxyacetylene, atomic-hydrogen, inert gas arc and flash-butt welding. A table of recommended arc welding procedures is included which suggests electrodes, preheating post-welding heat treatment. Tubular Products Div., The Babcock & Wilcox Co.

159 Preheating for Welding—This 8-pp illustrated article reviews welding procedures which have been found to produce crack-free joints under a variety of conditions. Includes basic guide to ferrous metallurgy, table of preheat temperatures. Tempil Corp.

METALWORKING AND MACHINE SHOP EQUIPMENT

160 Metal Quenching—Valuable information on the quenching of metals is available in this 24-pp booklet. It is illustrated with charts and graphs depicting cooling curves, cooling rates, effect of bath temperatures, agitation curves, hardness penetration curves, and transformation diagrams. Contains a series of typical case studies which detail the solution to some tough quenching problems. Such topics as mechanism of heat removal; properties of an ideal quenching medium; effect of increasing bath temperature; effect of increasing degree of agitation are discussed. Gulf Oil Corp.

161 Metal Forming Process—This 16-pp booklet on cold roll forming describes advantages of the method in terms of strength, appearance, accuracy, and economy. Includes a number of diagrams and photos descriptive of the process. Caine Steel Co.

162 Eccentric Geared Press—Bulletin 66, 28-pp, introduces a line of ruggedly-constructed straight side, single action eccentric geared presses. Describes such features as the crankless eccentric drive; tie rod frame construction; the low inertia pneumatic friction clutch; the air releasing brake, and others. Includes tabulated specifications for entire 100 to 1000-ton press line. Niagara Machine & Tool Works.

163 Pneumatic Bar Feed—A fully automatic magazine-loading bar feed which increases production is illustrated and described in this bulletin. Points out chief features of design and operation and includes specifications. Lipe-Rollway Corp.

164 Mechanical Finishing—Bulletin MF-100 describes products and equipment used for mechanical metal finishing. Lists standard buffs, compositions, sisal buffs, brushes, polishing wheels, polishing and lathes, accessories. Literature references are included for all products. Hanson-Van Winkle-Munning Co.

165 Diamond Grinding Wheels—Catalog 1233, 52-pp, contains a comprehensive assortment of standard sizes of diamond grinding wheels and hones. Included in the tables is the net price of each item listed, in various ordering quantities. Booklet also includes information on diamond wheel markings, selection of wheels, standard shapes of wheels, and suggestions on the use of diamond wheels and hones. Norton Co.

166 Automatic Blast Cleaning—Bulletin 226, 15-pp, describes various models of company's Continuous-Flo-Rotoblast barrels available for production line blast cleaning. Discusses advantages of the Rotoblast in plants operating on production-line basis, where it makes blast cleaning operation automatic and continuous. Lists various design features of the machine and includes diagrams of available models. Pangborn Corp.

167 Coolant Filter—Sixteen page Bulletin 350C illustrates and describes the Kleenall combination magnetic and fabric filter — which separates by permanent magnetic field and cleans by filtration through preselected fabric medium. Twenty-point check list serves as guide in selecting coolant cleaning equipment. Points out chief features and furnishes data on results expected from high degree of coolant clarity. Filtration Div., Barnes Drill Co.

168 Facts on Machine Anchoring—Case histories on use of this company's Unisorb for machine installations are told and illustrated in this 24-pp booklet. They cover metalworking plants, food processing plants, printing plants, others. Also included are test data on vibration and the use of felt. The Felters Co.

LUBRICANTS, LUBRICATION

169 Automatic Lubrication—This bulletin covers three basic elements of automatic lubrication — lubricators, distribution systems, and meter-units. Illustrates eight types of automatic lubricators and describes a typical pump and reservoir assembly. Distribution system details are given, including information on variety of tubing, junctions and flexible hoses. Bijur Lubricating Corp.

170 Data on Moly Sulfide—"Lubrication Properties and Industrial Applications of Pure Molybdenum Disulfide" is an illustrated technical paper presenting a new concept of lubrication by solids. According to it, extreme pressure or boundary lubrication, without the participation of solid lubricants, is practically impossible. The Alpha Corp.

171 Facts About Oil—This new edition of "Facts About Oil," a 32-pp reference book containing up-to-date statistics and data on the petroleum industry, discusses origin, exploration, transportation, marketing and supply and demand. Single copies will be sent to qualified plant engineers. Please state your job title. American Petroleum Institute.

REFRACTORIES

172 Refractory Selection—Prepared mainly as a review of practical refractory problems and their solution, this 12-pp booklet also discusses nomenclature generally applied to the various classes and types of granular refractories, outlining their characteristics and properties. Applications on both open hearth and electric steelmaking furnaces are covered. Basic Refractories, Inc.

173 Refractory Concrete—Basic information on recommended practice for mixing and placing refractory concrete, used in the metal, power, ceramic, and petroleum refining industry as a material to withstand service temp to 2600 F or more, is presented in this 16-pp manual. Sections are devoted to special properties of refractory concrete, aggregates, refractory insulating concrete, and structural design. Charts and tables afford easy reference for technical data. Universal Atlas Cement Co.

174 Refractories for Ceramic Industry—In addition to describing company's refractories, their properties and advantages to specific applications, this 28-pp illustrated booklet also contains engineering tables and other data used in connection with employment of refractories in the ceramic industry. Describes Crystolon kiln furniture, its applications in firing high tension porcelains, abrasives, dinnerware, and special electrical products. Lists kiln and furnace parts and gives full descriptions. Norton Co.

COOLING

175 Industrial Cooling Tower—Publication CT-1D-0.002, 36-pp, describes induced-draft cooling tower construction and applications. Profusely illustrated with photos, sketches, cutaway and exploded drawings showing the detail of structural and mechanical equipment, this bulletin will be of particular interest to plant engineers concerned with heat dissipation. Advantages of company's Counterflo design, methods of water distribution, and all components from basin to fan stack are covered in detail. The Fluor Corp.

Reader Service Cards for ordering bulletins are on the facing page. Be sure to include your name, job title, and company.

176 To Test Your Cooling Tower—This 20-pp booklet describes a simple, direct method by which a plant engineer can assure himself that the performance purchased is the performance a cooling tower delivers. The method outlined is said to be simpler, more direct and more conclusive than previous methods and requires a minimum of apparatus and effort. The Marley Co.

177 Large Capacity Condenser—Bulletin 123 describes the 400-ton capacity Aeropass condenser and fluid cooler. Explains and illustrates operating principles of the unit. Lists benefits offered for large liquid cooling and condensing applications. Niagara Blower Co.

WATER TREATING

178 Basic Anion Resin—Duolite Data Leaflet 31, 16-pp, describes in detail the nature and operating characteristics of Duolite A-41, a difunctional, strongly basic anion exchange resin—used for producing electrolytically pure water, free of all but trace quantities of silica and carbon dioxide. Text covers properties and advantages of Duolite A-41, performance characteristics, regeneration. Booklet includes chart of exchangers and adsorbent resins offered by this company. Chemical Process Co.

179 Testing Equipment—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and test sets for hardness, alkalinity, chloride, sulfide, etc.; cabinets and test sets for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer for water analyses. W. H. & L. D. Betz.

180 On Process Water—The value of a broad approach to industrial water problems through an overall survey of process water is outlined in this 6-pp folder. Gives examples of how a process water survey to find out how water is being used—or wasted—in a plant can have some or all of the following benefits: conservation of critical materials, reduction of water use, and savings in waste-water treatment. Hall Laboratories, Inc.

181 Pressure Filters— Company's line of filters and accessories, used to remove suspended solids such as dirt, turbidity, iron, oil and color, is described in comprehensive and well documented Bulletin 2225B. Specifications,

Preferred for Unusual Applications

WARREN-QUIMBY

Double External Bearing and Gear Hopper Type Pump

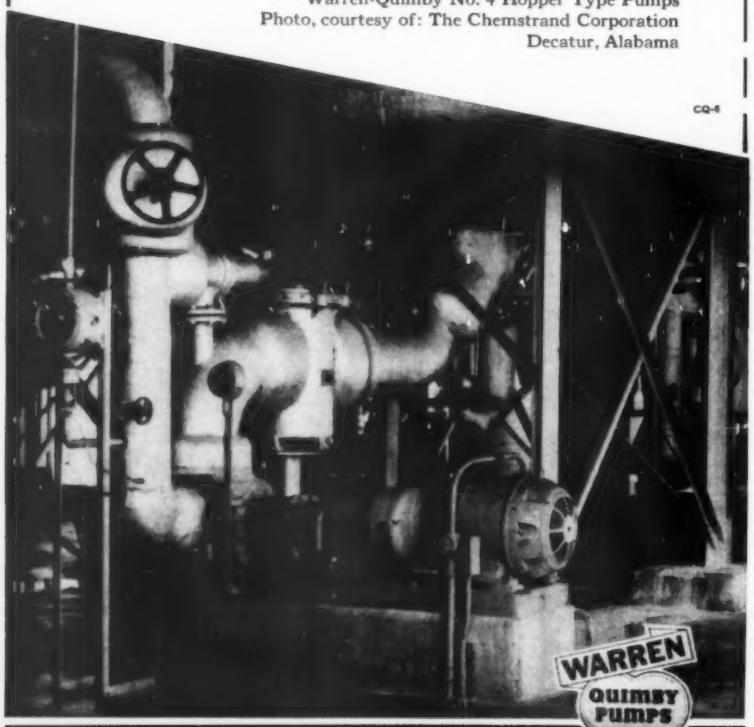
Essentially a unit for handling the most viscous liquids which barely flow and also preferred where it is desirable to mount the pump directly below a tank. This pump is widely used for handling acetates, dopes, tar, soap, sludges, chewing gum, tooth paste, chicle, food products, and where a short, unobstructed suction opening must be provided.

Many applications requiring the filtering of viscous liquids at high pressures up to 1000 P.S.I. are successfully handled with pulseless discharge and without violent agitation or meshing of gears.

Warren-Quimby Hopper Type Pumps are available in stainless steels, acid bronze, nickel and any other machinable metal, in addition to regular cast irons and steels, and with or without body jacketing.

Warren-Quimby No. 4 Hopper Type Pumps
Photo, courtesy of: The Chemstrand Corporation
Decatur, Alabama

CQ-4



WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.
Warren, Massachusetts

For more facts circle 626 on Reply Card

BULLETINS

(Begins on page 23)

operating characteristics, outline dimensions and installation photos included. The Permutit Co.

PACKING, SEALS

182 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M. D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

183 **Packing and Gaskets**—This 6-pp folder gives information on packings and gaskets of Chempac materials which are made of asbestos treated with Teflon. Describes several types: interlocked packings; coil, spiral and ring packings; general purpose gaskets; folded gaskets for glass lined equipment, gaskets for high pressure service. Johns-Manville.

184 **Data on O-Rings**—This 12-pp engineering brochure on O-rings gives detailed information on compounds, groove dimensions and sizes. Contains diagrams of typical applications and is intended to facilitate choice of O-ring seals for almost every type of application. Goshen Rubber Co., Inc.

FIRE PROTECTION

185 **Fire Extinguishing System**—A fire extinguishing system which employs thermostats at the fire hazards to detect fire and release the extinguishing system is the subject of this 12-pp bulletin. It includes many diagrams which illustrate design and operation features. Walter Kidde & Co., Inc.

186 **Fire Hose and Fittings**—This 8-pp catalog covers company's line of industrial fire hose and fittings. Includes construction details and illustrations of the complete line of fire and suction hose, extinguisher tubing, and fire hose couplings. Lists specifications for each type of hose as to size, weight, construction, and recommended use and working pressures. Boston Woven Hose & Rubber Co.

PLASTICS

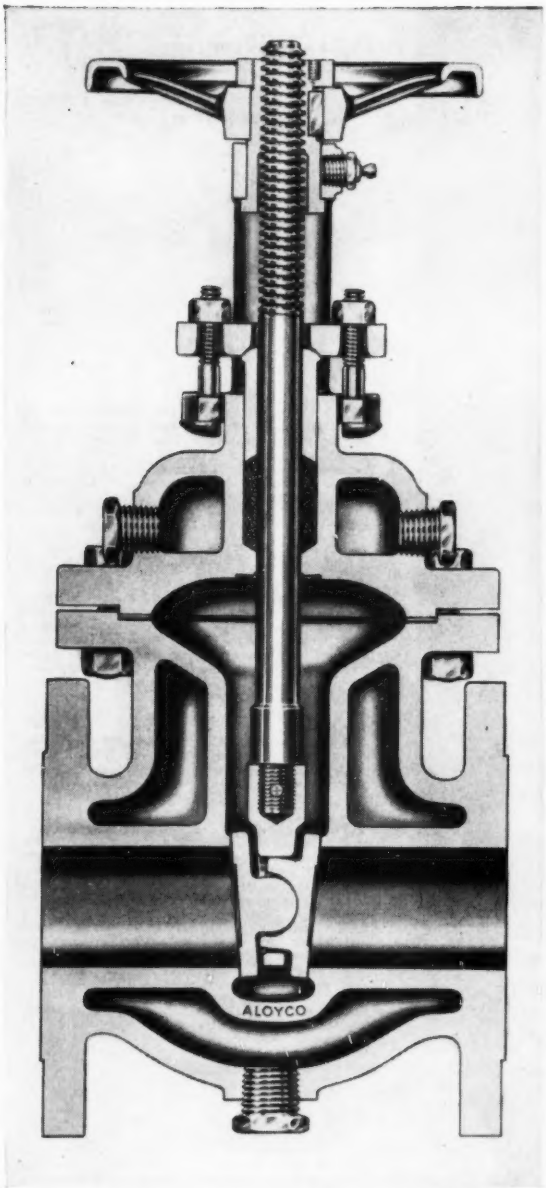
188 **Reference File of Plastics, Resins**—The 12-pp 1954 condensed reference file of Bakelite and Vinylite plastics and resins provides descriptive and application information. Covers molding and extrusion materials, wire and cable coverings, bonding resins, protective coating resins, laminating plastics, rigid sheets, flexible film and sheeting, calendering materials. Bakelite Co., Div., Union Carbide and Carbon Corp.

189 **Data on Polyester Film**—Two new technical reports on Mylar polyester film—one covering the film's physical, chemical and electrical properties, and one on adhesives developed for bonding Mylar to other materials—are offered. The former, 16-pp Technical Report -1, complete with charts, diagrams, and tables, lists types and gages available, provides a detailed table on physical properties which are compared with those of cellophane, polyethylene, acetate films. Technical Report-2, 8 pp, on adhesives, includes those for use with Mylar. Film Dept., E. I. du Pont de Nemours & Co.

190 **Expandable Polystyrene**—A foamable polystyrene is described in 24-pp Bulletin C-4-204. Applications of this product in various industrial fields, including thermal insulation, novelties and displays, buoyant members, sandwich construction, electronics, and packaging are discussed. Technical information is included. Koppers Co., Inc.

OTHER EQUIPMENT

191 **Air and Hydraulic Cylinders**—This 12-pp pamphlet points out new economies, convenience, and versatility in the use of air and hydraulic cylinders. Highlights "standardization" of critical cylinder mounting dimensions and stroke lengths, interchangeable detachable mountings; shows how these and other advantages can be obtained for automation and other heavy duty service. Contains drawings and tables showing large degree of standardiza-



Cross-section shows how jackets extend to edge of flanges and include stuffing boxes on this Aloyco 1105 Jacketed Gate Valve. Also shown are the non-fouling, ball-and-socket split-wedge disc and mar-proof rocker-type gland plate and follower.

Now-

fully jacketed valves put the heat on slow-moving corrosives

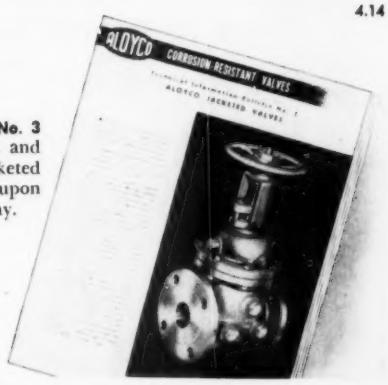
Does your plant handle corrosive fluids that slow down or solidify under normal temperatures?

Then you're in line to benefit from the heat-holding design of Aloyco jacketed Gate, Globe and Check valves. Besides having all the Aloyco features shown at left, they're the only high alloy valves on the market to be *completely jacketed.*

They keep valves at higher temperature than steam tracing systems, and provide more uniform, less hazardous heating than thermal electric methods. You'll find them especially useful in line processing of rosin, resins, tars or tar oils, pthalic or maleic anhydrides, molten sulphur and other viscous liquids.

We'll be glad to arrange for a trial installation of Aloyco jacketed valves in your plant. Write the Aloyco Corrosion Engineering Service for further information. **Alloy Steel Products Company, Inc., 1308 West Elizabeth Ave., Linden, N.J.**

4.14



Fact-filled Bulletin No. 3 lists specifications and uses of Aloyco Jacketed Valves. Send coupon for your copy today.

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BULLETINS

(Begins on page 23)

tion of critical mounting dimensions between various cylinder manufacturers, and another table giving internal fluid pressure stresses of components. Miller Fluid Power Co.

192 Boiler Baffles—Recent data on design of modern boiler baffles for streamlined flow of combustion gas over heat-absorbing surfaces is presented in 20-pp Bulletin BW-54. Shows some 30 boiler-setting plans, with an analysis of how each arrangement of tubes is baffled. Material covers every basic boiler construction and numerous variations of each design. One section is devoted to baffle design principles on both new and old boilers. The Engineer Co.

193 Tube Expanders—Eight-page Bulletin Y-38 describes company's line of tube expanders for condensers and heat exchangers, and gives full data on how to choose the proper expander for each rolling job. Includes chart listing prices and dimensions. Also contains material on tube sheets, drive motors, acceptable practice, operating instructions and cleaners for small tubes. Lagonda Div., Elliot Co.

194 Gas Burners and Furnaces—Catalog 55, 36-pp, illustrates and describes a line of burners, furnaces, valves, torches, mixers, blowers, and water warmers. Features furnaces and burners for specific purposes—such as Hi-Speed heat treating furnace 120 for fast, even, economical hardening of high speed and carbon steel dies, tools. Presents a line of temperature regulating and safety control equipment. Johnson Gas Appliance Co.

195 Wire Rope—Of interest to plant engineers concerned with wire rope, Bulletin 5448 shows special boat slings, barge tow line, cable assemblies and slings. Macwhyte Co.

196 Chemical and Processing Equipment—Blending, processing, and heat exchange equipment for chemical and processing industries is described in 12-pp Bulletin 13. Provides photos and specifications on a variety of sizes and adaptations to company's three basic types of blenders. Describes process equipment in ranges from small 5 to 15 gal packaged pilot plants and autoclaves to kettles and reactors of 1000 gal capacity. Patterson-Kelley Co.

197 Easy Layout Method—"The ABC of the Repro-Templet Method of Plant Layout" explains and illustrates the advantages of this efficient method of plant layout. Brochure contains experimental sheet of Repro-Templets—so you can try it yourself—and includes full price list. Repro-Templets Inc.

198 Steel Shelving—Bulletin 281, 12-pp, features company's line of steel shelving materials and accessories. It describes shelving uprights, shelves, shelf brackets, shelving backs, shelving parts, shelving sections, others. Includes diagrams, photos, and specifications on all items. De Luxe Metal Furniture Co.

199 Fuel Oil Heaters—Bulletin 743, 20-pp, covers company's line of fuel oil heaters, with detailed information on dimension, capacities, and installation. Contains tables and diagrams describing each model. In addition, two pages are given to tables which help engineers select the correct fuel oil heater for any heavy oil burning installation. A section of catalog is devoted to a quiz on fuel oil heating problems. Manning & Lewis Engineering Co.

200 Tubing Support System—Twelve-pp Bulletin 254 presents a system for permanent and continuous support of instrument tubing. All items and fittings are illustrated by photo or dimensional drawing. Details of actual installations show some of the methods by which this system can be quickly and economically erected at the job site. Instrof Inc.

201 Ceramic Dust Control—How to control dust in the various segments of the ceramic industry is told in Bulletin 482. Gives case histories of four companies showing how dust conditions due to grinding, screening, mixing, classifying, elevating and packaging operations are prevented by local exhaust ventilation in which cloth-tube-type collectors are used. American Wheelabrator & Equipment Corp.

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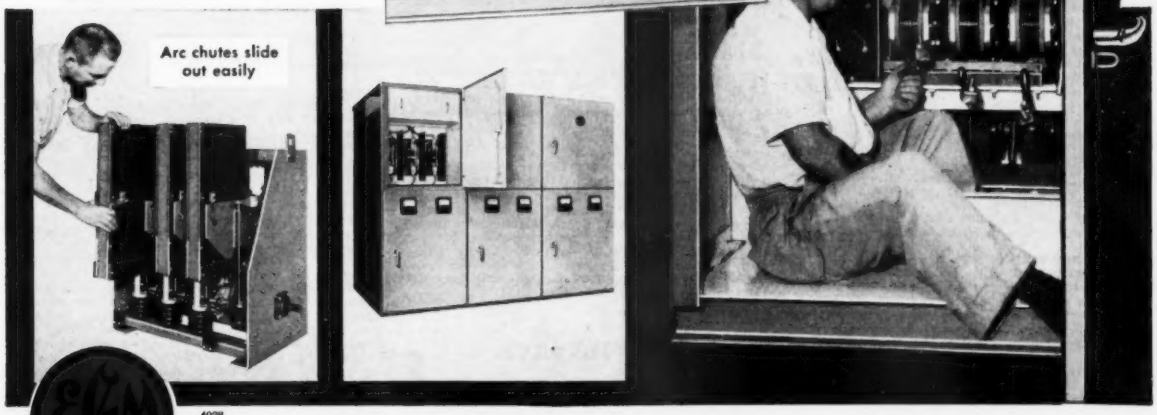

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 195-196.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

301 **More Hammering Power**—This 20-pp book covers the uses of company's line of portable electric hammers and hammer tools. Contains many photos showing applications for the tools, plus charts giving relative penetrations of the hammers and hand operated tools with the same size drills. Cutaway and exploded views which graphically show the principle of operation and inner works are included. A cross-index chart lists the major applications in various fields of industry. The Black & Decker Mfg. Co.

302 **Tools for Mechanics**—Catalog U is a 106-pp ordering book covering a wide range of power and hand tools for production, maintenance and service work. Describes, pictures and gives application tips and sizes on wrenches of all types, pullers, drills, sanders, polishers, grinders, reamers, taps and dies, testing tools, soldering irons, tool sets, benches and cabinets. Includes price list. Snap-on Tools Corp.

303 **Pipe Tool Ordering Guide** — Catalog 2-51, 8-pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

304 **Hand Torches, Tips**—Catalog ADC 702B, 36 pp, covers company's line of torches and tips for oxyacetylene cutting and welding, listing every Airco standard torch and tip along with necessary mixers, extensions, adapters and accessories that are used with the torches. Material is presented through illustrations, charts and descriptions. Air Reduction Sales Co.

305 **Metal Spraying Gun**—Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

306 **Resistance Welding**—Featured in this 24-pp catalog are newly-designed tips and holders recently added to company's equipment. Full information is also given about other holders, tips, seam welder wheels and shafts and bushings, in manufacturer's line, as well as flash, butt, barrel and other welding dies. Ampco Metal, Inc.

307 **Welding Electrodes**—Announced as one of the most complete manuals available on stainless steel welding electrodes, 24-pp Bulletin WE-166 covers in detail the metallurgy of stainless steels. Provides selector tables, other tabular material on welding processes. Describes each of company's welding electrodes as to typical mechanical properties, chemical analysis range of deposited metal. Welding Products Div., A. O. Smith Corp.

308 **Flux Recovery Equipment** — How company's flux recovery equipment salvages valuable flux, saves man-hours, and speeds and improves welding is told in this 6-pp illustrated bulletin. Describes primary separator and feed tank. Pictures some typical recovery installations. Invincible Vacuum Cleaner and Mfg. Co.

309 **Improved Cutting Oils**—Cutting oils for keeping parts and tools up to 50 deg cooler and representing a new concept in non-emulsifying oils are described in two new technical bulletins. Form A-2724 describes Sunicut 11-S and 209-S, non-staining dual-purpose oils primarily for medium duty to heavy duty operation on automatic screw machines. Form A-2723 covers Sunicut 102-S and 110-S, which contain active-type sulfur and are effective for heavy-duty operations. Sun Oil Co.

310 **Data for the Shop**—"Fluids and Facts for Metal Working," is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Booklet also includes product data on industrial oils, machine tool lubricants, greases, quenching and tempering oils. Standard Oil Co. (Ind.).

CONSTRUCTION

311 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastening. A table shows properties, sizes available and intended applications. Masonite Corp.

312 **Lowdown on Suspended Ceilings**—Twelve-pp Bulletin A-129 is a "tell-all" brochure on a radiant panel heating, cooling, and acoustic control ceiling. Tells how company's three-way functional (suspended) ceiling is easy to lay out and install, competitive in cost. Diagrams and charts accompany text, which includes a brief of 12 advantages of this ceiling. Also provides departmentalization of components, performance characteristics, design and layout procedures, installation short cuts. Burgess-Manning Co.

313 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

314 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and shows allowable loads. Jones & Laughlin Steel Corp.

315 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Alan Wood Steel Co.

316 **Heavy-Duty Flooring**—An emery aggregate flooring for heavy duty use is discussed in 8-pp Bulletin 653. Gives test data on this flooring. Describes safety features, improved trucking, heat resistance and other advantages. Walter Maguire Co.

317 **Air Tools, Paving Breakers**—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

MAINTENANCE

318 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

319 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

320 **Painting with Aluminum**—Again made available to plant engineers is Form AD-228, 32 pp, on the use of aluminum paint. Discusses advantages of aluminum paints, describes three basic types for non-absorbent surfaces for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

321 **Protective Paints**—Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal surfaces. Cellulose Products Dept., Hercules Powder Co.

322 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

323 **Corrosion Protection Data**—A detailed study of the performance of various protective coating systems, this bulletin gives test data on 11 coating systems exposed up to 83 weeks in hydrochloric acid atmosphere. Illustrated with photos, includes corrosion-failure time comparison chart. Gates Engineering Co.

324 **Blower-Suction Cleaner** — Data on a portable combination blower suction cleaner for cleaning machinery motors, stock bins are offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

325 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, road patching, roofing materials. Includes instruction for use. Flexrock Co.

326 **For Fast Floor Repairing**—This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

327 **Proper Care of Floors**—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintainance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, wood. West Disinfecting Co.

328 **Vacuum Cleaning Equipment**—Vacuum cleaning units to suit requirements for commercial buildings, industrial plants and buildings where noise is objectionable are listed in illustrated Bulletin 152. Also shown are furnace cleaners, units for emptying sump tanks, belt-drive units and special units. The Spencer Turbine Co.

329 **Combination Scrubber-Vacuum** — A single unit that applies the cleanser, scrubs, and picks up—all in one operation—is described in this illustrated literature. Gives full specifications for company's Model 213P,

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DATA FILE

(Begins on page 202)

for large area floors, and gives various methods of combination-machine-scrubbing suggested for hard, soft, oily floors. Also covers units for smaller and larger operations in gasoline-powered as well as electric models. Finnell System, Inc.

MATERIALS HANDLING

331 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is a newly revised edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

332 **Engineered Monorail Applications**—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

333 **Locomotive Cranes**—Catalog 84, 16 pp, stresses advantage of the torque control unit used in company's cranes and features illustrations of the mechanism and converter unit. Describes in detail the sealed, anti-friction bearings, air controls, brake, limit switch and other components. Orton Crane & Shovel Co.

334 **Hydraulic Cranes**—This pocket-sized pamphlet, S-30-H, describes company's truck-mounted, all-hydraulic Hydrocrane. Explaining why 38.6 percent of all Hydrocranes sold are repeat orders, the text points to such features as precision hydraulic control, telescoping boom, fast job-to-job travel, self-powered crane, and quick conversion to use with various attachments. Bucyrus-Erie Co.

335 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

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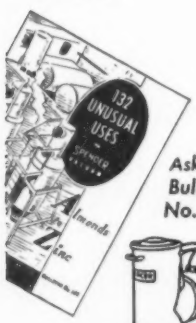

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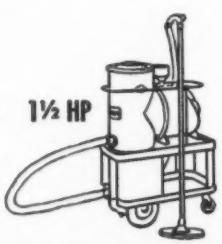

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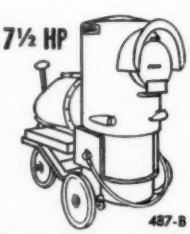

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336 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastening are also covered, and there's a table listing common conveyor belt maintenance problems with their causes and remedies. The B. F. Goodrich Co.

337 **Conveying Systems**—How this manufacturer's conveying systems are being used in handling dry pulverized and granular materials is shown in illustrated Bulletin FK-26, 16-pp. Types of systems and component parts are described and installations pictured. Fuller Co.

338 **Railway Car Mover**—"Reports from the Field on Trackmobile Savings and Advantages" tells how this small unit travels on road and track hauls and switches freight cars and requires only one operator. Stresses economy and easy handling. Whiting Corp.

339 **Fork Truck Efficiency Test**—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

340 **Lift Truck Work Kit—A** method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as for planning for future needs. Includes typical materials handling examples to show technique for application of the data as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

341 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, prices and specifications are included. Wright Hoist Div., American Chain & Cable Co., Inc.

342 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

343 **Industrial Lifts**—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, service lift. The Wayne Pump Co.

344 **Electric Hoist Manual—Catalog 215-B** offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

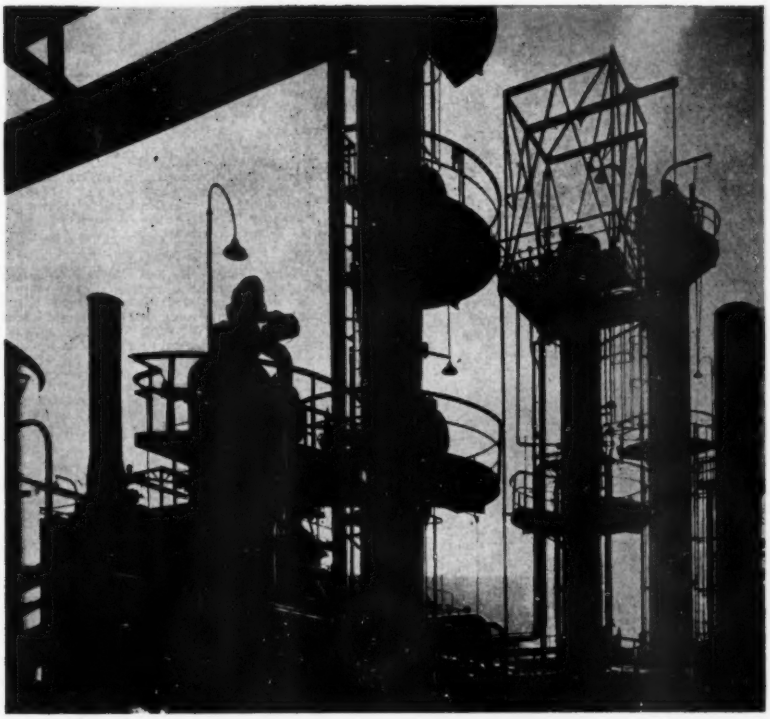
345 **Portable Hoists**—This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.

346 **Handling Baskets**—Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machining, washing, plating. Wire & Iron Products, Inc.

347 **Shock Absorbing Casters** — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

WIRE ROPE, SLINGS

348 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and filled



A section of the new Shell Chemical Corporation plant at Ventura, California. Product: liquid ammonia (NH_3), chiefly for soil fertilization, made by reacting nitrogen from air with hydrogen from natural gas.

How Rome Synthinol® Helps Solve Heat and Corrosion Problems

Some 16,000 feet of Rome Synthinol, color-coded for circuit identification, are doing a job at Shell Chemical's new Ventura (Calif.) petrochemicals plant.

Like most chemical plants, and many other industrial operations, this Shell plant runs 24 hours a day all year round. And while electrical cable may not be the "star performer" at Ventura, like other component equipment it has a vital role in a round-the-clock type of operation.

Dependability, therefore, is a *must* and the use of Rome Synthinol is an example of how Shell has met the "must" for heat and corrosion resistance. Rome Synthinol polyvinyl chloride insulation securely protects electrical wiring against high temperatures and corrosive chemical conditions. It is National Electric Code approved as Type TW.

Over 18 Miles of Other Cables

Specifically engineered Rome products are performing other significant jobs for Shell at Ventura.

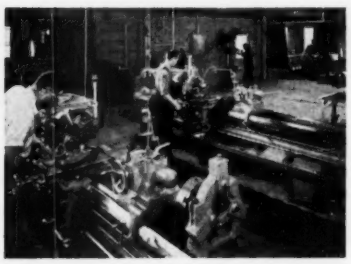
. . . there's *RoZone-RoPrene* cable with its all-resistant properties—for example, the high ozone resistance of the *RoZone* oil-base insulation. Also there is *RoMarine-RoPrene*, specified for heat and moisture resistance. The RoPrene (Neoprene) sheath, common to both these cables, provides rugged mechanical protection.

. . . and there are more thousands of feet of Rome quality braided building wires, also color-coded for ready identification in multiple circuits.

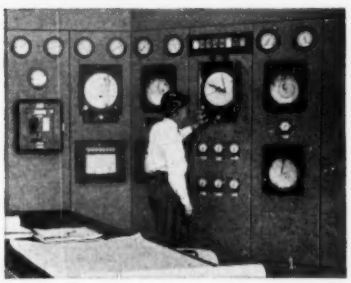
Personalized Engineering Help

Whether your wire and cable problems are unusual, extra tough, or ordinary—whether your project is modernization, expansion, or brand new facilities, Rome Cable can help you, too.

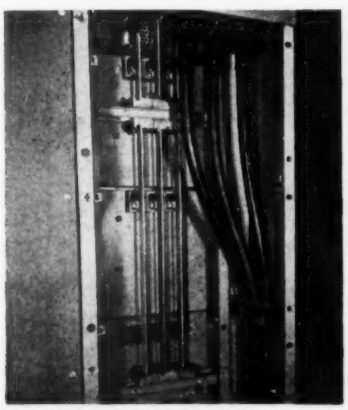
Write today for information on YOUR wire and cable requirements. Personalized Rome engineering help is available coast-to-coast, when YOU need it.



Modern lathes in the machine shop maintain the efficiency of precision plant equipment.



Part of an instrument board controlling intricate processes in gas reforming and purification sections.



One of many neat installations readily made with Rome cables such as RoZone-RoPrene, RoMarine-RoPrene and Rome Synthinol.

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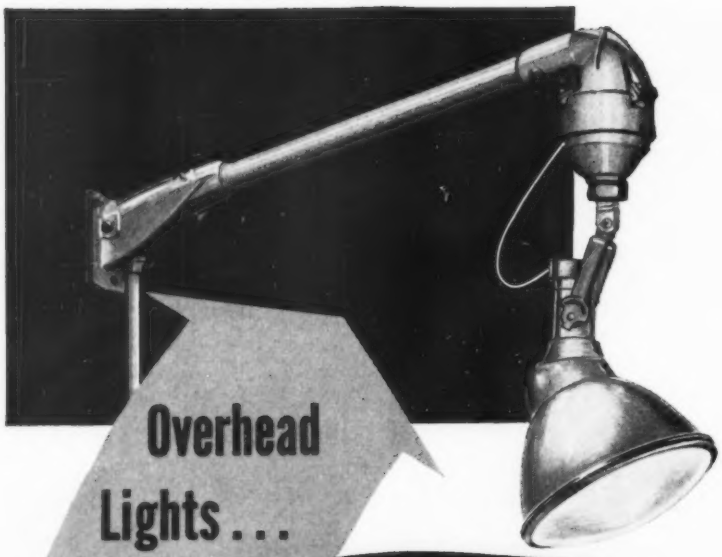

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DATA FILE

(Begins on page 202)

with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

349 **Sling Handbook and Riggers Manual**—In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are sling fittings. Information on care of slings, data on braided wire fabric and directions on splicing braided wire sling fabric included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments. Union Wire Rope Co.

350 **Slings for Industry**—Form 5308 is a compact reference bulletin packed full of sling data. Lists slings of approximate breaking strengths of 1000 lb to 243.4 tons, along with their safe loads. Macwhyte Co.

VENTILATING AND AIR CONDITIONING

351 **Heating, Ventilating Units**—Catalog 1620, 40 pp, helps the plant engineer plan, specify and order the proper heating and ventilating units (air volumes from 1200 to 23,000 cfm; heating capacities from 100,000 to 2,500,000 Btuh) for moving, heating or cooling of air. Five data sections cover descriptive performance, layout, engineering and service. For determining unit size, a step-by-step procedure is included. Hypothetical problems show proper use of performance data, curves and charts in selecting correct unit. Sturtevant Div., Westinghouse Electric Corp.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 195-196.

352 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

353 **Air Purification**—Industrial installations of Flexaust hose and Portovent duct for moving air, dust, fumes, gases, and materials are described in Bulletin 40. Illustrates many applications. The Flexaust Co.

354 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters, for the removal of air-borne impurities given. Dollinger Corp.

HEATING, HEATERS

355 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

356 **Buying a Portable Heater?**—Stressing safety factors involved, this 40-pp booklet, "Guide to the Selection and Use of Portable Space Heaters," analyzes temporary heating equipment from standpoints of personnel well-being, property protection and fire and accident prevention. Classifies basic types of direct, indirect-fired heating devices. Herman Nelson Div., American Air Filter Co., Inc.

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and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors! And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

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DATA FILE

(Begins on page 202)

357 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses and ordering data. J. A. Sexauer Mfg. Co., Inc.

358 **Unit Heaters** — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

359 **What Unit Heaters Can Do**—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation. 8-pp Bulletin 149-A discusses advantages of these heaters and gives performance data. Modine Mfg. Co.

360 **Steam Heating Systems**—Five major types of steam heating systems, with and without control, and a full line of valves, traps and steam power specialties are described in Bulletin 110, a 20-pp condensed catalog. Features company's Selectotherm system—automatically controlled high vacuum steam heating system that adjusts its heat output and fuel consumption to outdoor temperature conditions. Also describes a system for installations that are zoned, that use steam for purposes other than heating, and that use steam supplied by central station. Illinois Engineering Co., Div., American Air Filter Co., Inc.

361 **Utility Heaters**—Fully illustrated, Catalog 6253 presents heaters for use in mobile units and small space heating requirements. Includes capacity and design information. Young Radiator Co.

OVENS, DRYERS

363 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry, source of heat, selection of heaters, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

364 **Industrial Ovens** — Thirteen types of company's Convectioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

365 **ABC's of Dryness**—Eight-pp Bulletin 16.0.081 presents packaged dehydration units for efficient drying of air or other gases. Tells what these dryers can do, what they will remove dryness from and where they are recommended for use. Explains drying operation; discusses absorbents and equipment utilized, giving construction details and sizes offered. Typical arrangements for both full-stream and split-stream reactivation are diagrammed, and selection information included. Equipment Div., J. F. Pritchard & Co.

DUST CONTROL

366 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

367 **Dust Control, Blast Cleaning**—Bulletin Cleaning 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

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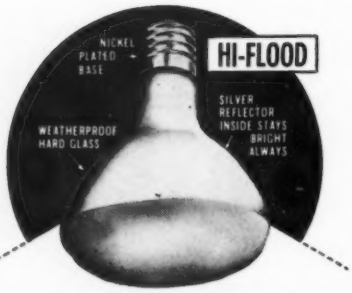

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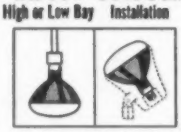

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DATA FILE

(Begins on page 202)

368 **Improved Dust Filters**—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters that can be furnished or unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are described in detail. The Day Co.

369 **Dust Collectors** — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

370 **Dust and Fume Collector** — Revised Bulletin 164-3 describes automatic bag type dust arresters, with illustrations of principal components and schematic diagram of typical installation. Capacities under 2 to 1 and 3 to 1 cfm ratios are quoted in table of arrester sizes and dimensions. Collecting efficiency and other advantages offered by cyclic cleaning are discussed. The Northern Blower Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

371 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

372 **Valves and Fittings**—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

373 **Relief Valves** — Twenty-pp Publication 5200 is replete with data on company's multi-port relief valves for steam, air and gas service. Charts, diagrams, tables and examples of plant operating conditions serve to show how to select a relief valve. Text and illustrations show advantage of these valves over other relief valves, and booklet also shows how the Multi-port relief valve can be used as a differential pressure spillover valve or as a check valve in closed systems. Cochrane Corp.

374 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells, in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and the importance of stem operation is treated. A final chapter is devoted to common materials of valve construction. Crane Co.

375 **Pressure Reducing Valve** — Bulletin 228, 8 pp, describes and pictures a pilot-operated pressure reducing valve for automatic control of reduced pressure required in steam service. Gives advantages of the valve, illustrates method of installation and explains its operation. McAlear Mfg. Co.

376 **Reducing Valve Engineering Data** — Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

377 **Steam Trap Solutions**—Bulletin F.151, 36 pp, is the newest edition of this company's well known booklet, "Solving Steam Trap Problems." Organized for easy reference, this illustrated booklet provides specifications and capacities of steam and float traps, air release valves, pipe line strainers. Tells how to calcu-

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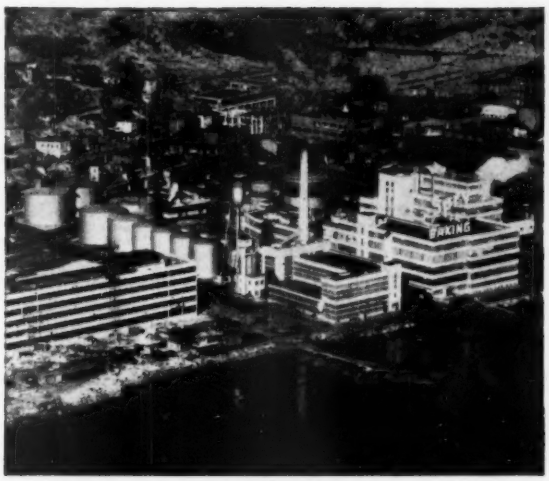

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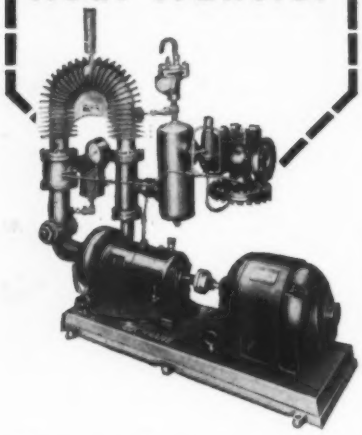

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DATA FILE

(Begins on page 202)

late condensation loads and select traps for unit heaters, jacketed kettles, submerged surfaces. Gives pointers on installing and servicing traps. Also included in this edition is information on combination float and thermostatic traps. The V. D. Anderson Co.

378 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

379 **Steam Trap Reference Manual**—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

380 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

381 **Steel Unions**—This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Clayton Mark & Co.

382 **Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

383 **Unions and Fittings**—Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees, fittings. Dart Union Co.

INSULATION

385 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

386 **Flexible Duct Insulation**—Form F-180 describes and gives product specifications for fiber glass flexible duct insulation. Advantages are cited, and easy installation procedure is illustrated. Also included are data on thermal insulating and acoustical insulating qualities. Fiber Glass Div., Pittsburgh Plate Glass Co.

387 **Improved Heat Insulation**—This 8-pp bulletin describes Super-Light 85% Magnesia for temperatures to 600 F, available in cement blocks, pipe sections. Twelve advantages of this lightweight insulation are detailed. Recommended thickness, physical characteristics, prices are given. Also included is information on combination coverings with Tempchek inner layer for temperatures from 550 to 1500 F. The Philip Carey Mfg. Co.

PUMPS, COMPRESSORS

388 **Compressors** — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

389 **Vertical Compressors** — Double-acting, motor driven vertical compressors are described

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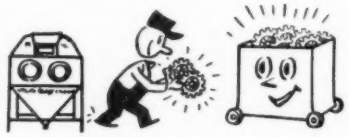

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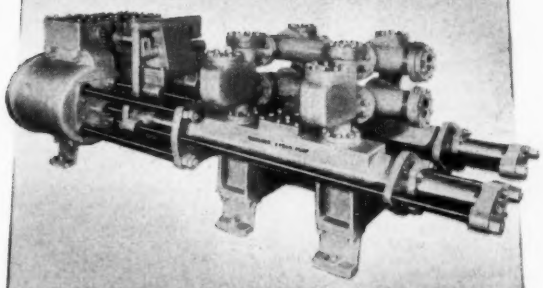
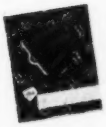


PROOF AGAIN THAT QUALITY PACKING PAYS

For WAGENER PUMP CO. of Canton, Ohio, the common pump problem of scored rods due to hardened packing just doesn't exist. In 45 years of using Palmetto 1000 Braided Square Packing on the steam and liquid rods of reciprocating pumps, Wagener has not had to consult on this problem. Savings for Wagener—Savings for Wagener customers!

PALMETTO 1000 is built up from high grade 12 cut white asbestos yarn—each strand saturated separately with a special lubricant before being twisted and braided into the finished packing. This thorough lubricating technique means maximum pliability under extreme temperature conditions — frictionless operation — score-free rods and shafts — long, uninterrupted service.



What worked for Wagener will work for you ..

Write in for details on Palmetto 1000 and other Palmetto Self-Lubricating Packings.

PALMETTO Packings

packing more performance into every application

GREENE, TWEED & CO. North Wales, Pa.

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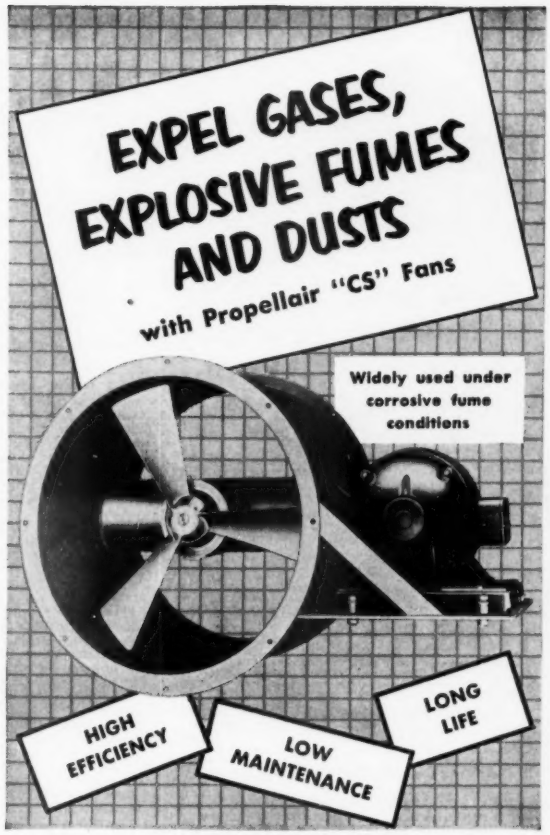
EXPEL GASES, EXPLOSIVE FUMES AND DUSTS

with Propellair "CS" Fans



■ **Propellair** "CS" Fans are rugged, heavy-duty units for duct installation. The cast aluminum alloy airfoil propeller is housed in a welded heavy-gauge steel duct section and belt guard with internal bearing assembly.

Robbins & Myers *All-Weather Motor* located outside airstream. Sizes 20" to 60", with certified air deliveries of 3750 to 85,000 c.f.m. Available with corrosion and abrasion-resisting finishes and with ventilated bearings suitable for operation in high temperatures.

Simplified Installation

Propellair "CS" Fans are built to fit standard duct sizes without the need of elbows. The fan drum has front and rear flanges drilled for easy mounting into duct system.

Our engineers are at your service for fan selection and application advice. Write for Bulletin 650PE.

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A tiny, 1/32" faucet leak wastes 95,040 gallons—*$24.14* worth*—of water yearly.

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And this is the dollar loss caused by only *one* pinpoint leak!

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Oil (792 gals.) **$91.08	$24.14	$115.22
Coal (9,879 lbs.) 88.91	24.14	113.05
Gas (84,411 cu. ft.) 84.81	24.14	108.95

*Water costs (figured at $1.90 for 1,000 cu. ft.) authenticated by Hackensack Water Co. **Fuel costs authenticated by American Gas Association.

Save money; cut costs; stop leaks with dependable 'Sexauer' Easy-Tite faucet washers.

Built like a tire with Fiberglas reinforcement

Easy-Tite faucet washers are made of a special du Pont product, instead of rubber, and reinforced with Fiberglas. The result is a washer that resists the closing squeeze that splits and mushes ordinary washers. And Easy-Tites withstand destructive heat (up to 300° F. by test). These features explain why *'Sexauer' Easy-Tites outwear ordinary faucet washers 6 to 1!*

By avoiding labor on those 5 additional repairs, Easy-Tites cut today's high maintenance costs 83⅓%! But Easy-Tites not only save water, fuel, labor; they also prolong the life of expensive fixtures.

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DATA FILE

(Begins on page 202)

as to distinctive features, regulation, available and construction details in 16-pp illustrated Bulletin 765-5. The improved cylinder design of these compressors and valve assemblies are discussed in detail. Booklet also describes air intake filters, air receivers and aftercoolers available; and pictures some installations of the compressors. Chicago Pneumatic Tool Co.

390 Screw Pumps—Described and illustrated in 6-pp Bulletin WQ-S206 are screw pumps of the double external bearing and gear type and the double external bearing and gear hopper type. Bulletin gives design details, application suggestions, and dimensional data. Warren Steam Pump Co., Inc.

391 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

392 How to Solve Pumping Problems — A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

393 Installing a Pump — Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

PACKINGS, GASKETS, SEALS

394 Packings and Gaskets—In this 40-pp belting and packing manual (NY-2697-P) are helpful charts plus information on the care, use and maintenance of rod and sheet packings and gaskets. A complete engineering section contains all necessary charts and tables for determining working specifications of packings. Also included are packing recommendation charts. New York Belting and Packing Co.

395 Buyer's Guide on Packing—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

396 Metallic Packing — This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, used. A. W. Chesterton Co.

MECHANICAL POWER TRANSMISSION

397 Power Transmission Equipment—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

398 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

399 Sprockets, Roller Chain—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and order-

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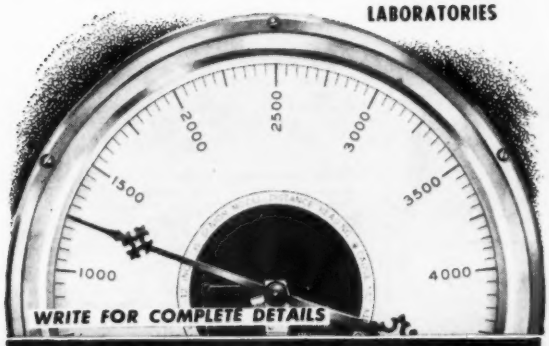

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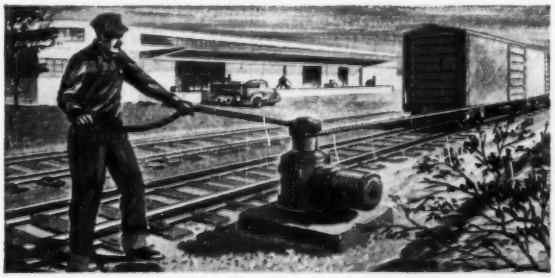

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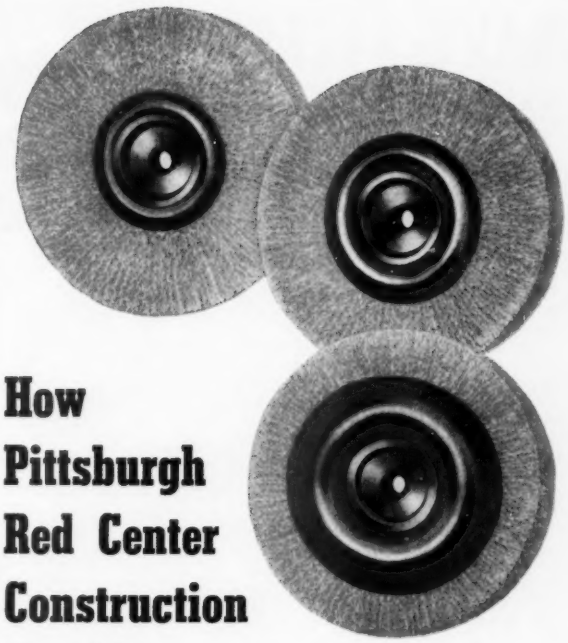

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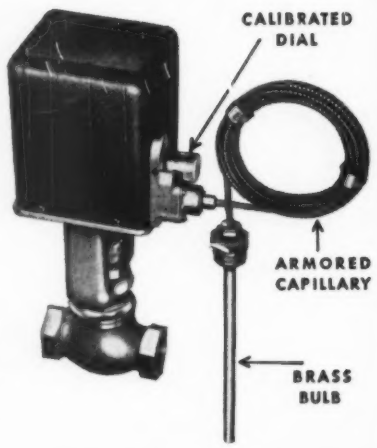

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DATA FILE

(Begins on page 202)

ing roller chain and sprockets. A page devoted to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Co.

400 **Adjustable V-Belt**—This 8-pp catalog covers company's new Veelos TD and TE v-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows correct lengths for these belts. Manheim Mfg. & Belting Co.

401 **Spherical Roller Bearing**—A new roller bearing, designed for long service and increased capacity, easy alignment, is described in this bulletin. Includes sizes available, also data on increased life capacity expected. SKF Industries, Inc.

402 **Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

403 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

HOSE AND TUBING

405 **Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

406 **Metal Hose Manual** — Technical Data Book U-111, 24 pp, includes information on application, temperature ranges of various types of metal and wire braided hose, dimensions, couplings, assemblies. Types of hose manufactured by this company are illustrated and described, including seamless all-metal flexible pressure hose; interlocked suction, blower and conveyor hose; square locked conduits and flexible spout tubing; double wire-braided hose for high pressure. Universal Metal Hose Co.

INSTRUMENTS, CONTROLS

407 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided and handy space requirement tables included. The Clark Controller Co.

408 **Flow Meters**—Catalog 2320, 58 pp, fully illustrated, describes all types of manufacturer's flow meters, including indicating, recording, integrating and controlling instruments of evenly graduated and square root types, as well as area meters and differential converters. Includes tables on flow approximations, installation information, factors necessary to determine if fluid to be measured can be properly handled. Industrial Div., Minneapolis-Honeywell Regulator Co.

409 **For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of com-

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6200

. . . rigid, unplasticized Polyvinyl Chloride

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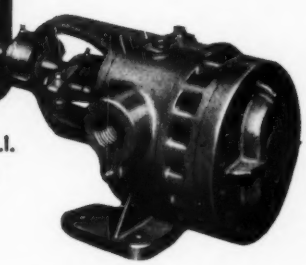

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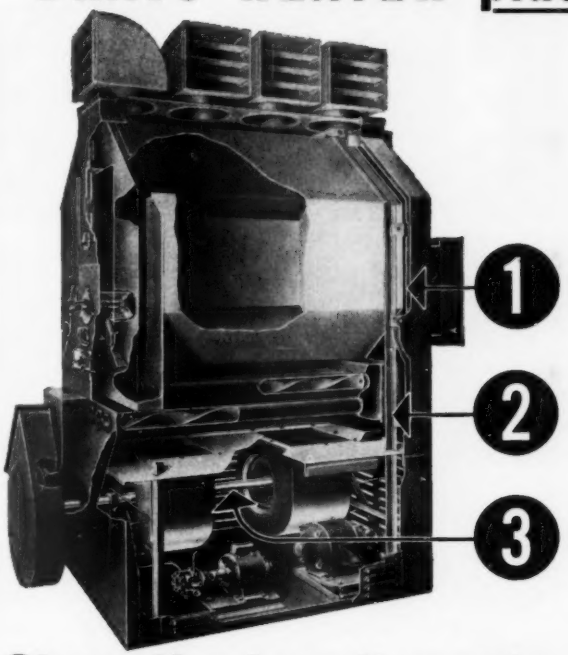

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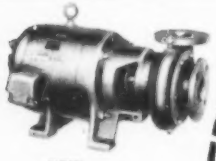

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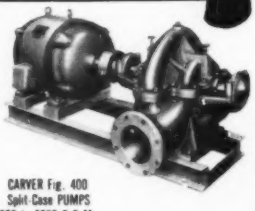

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Whatever your requirements, there is a pump in CARVER'S Complete Line that will give you outstanding performance over a wide range of capacities and heads. CARVER . . . your best buy for better pumping.

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CARVER
the quality name in pumps

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DATA FILE

(Begins on page 202)

pany's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

410 **Wide Range Regulator** — Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

411 **Electronic Controls**—Bulletin F 6437, 24 pp, complete with simplified diagrams, explains fundamentals of electronic temperature controls and their application. Discusses bridge circuit, sending elements, type of controls, control applications. Includes on-off temperature control, humidity, outdoor reset hot water control. Barber-Colman Co.

412 **Gage Glasses**—Pyrex and Corning gage glasses, their dimensions and tolerances, recommended maximum working pressures, are discussed in Bulletin EG-1. Explains how to cut odd lengths of tubular gage glasses and how to install them. Technical Products Div., Corning Glass Works.

413 **Portable Scales**—Form 2004 describes company's new 200 series of scales, presenting both bench and full-height models. Stresses larger platform, new locking mechanism, other advantages of these scales for use on receiving dock, in manufacturing processes, shipping rooms. Toledo Scale Co.

414 **How to Weigh Tanks**—Bulletin 4106, 8 pp, explains how to weigh the contents of tanks, bins, and hoppers electronically with company's SF-4 load cells. Also covers installation design considerations such as mountings, temperature effects, corrosion protection, and vibrations. Diagrams and sketches accompany text. Baldwin-Lima-Hamilton Corp.

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Reversible Ratchet STOCKS and Adjustable DIES

Exceptionally convenient where space is limited, this stock simplifies pipe threading close to walls, in corners and whenever operating room is restricted. With *adjustable* dies (cut exact, over or under size threads) it is an ideal tool where valves and fittings are being installed or maintained.

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KEEPS PIPELINE DIRT AND SCALE from damaging pumps, air tools, reducing valves, temperature regulators, steam traps

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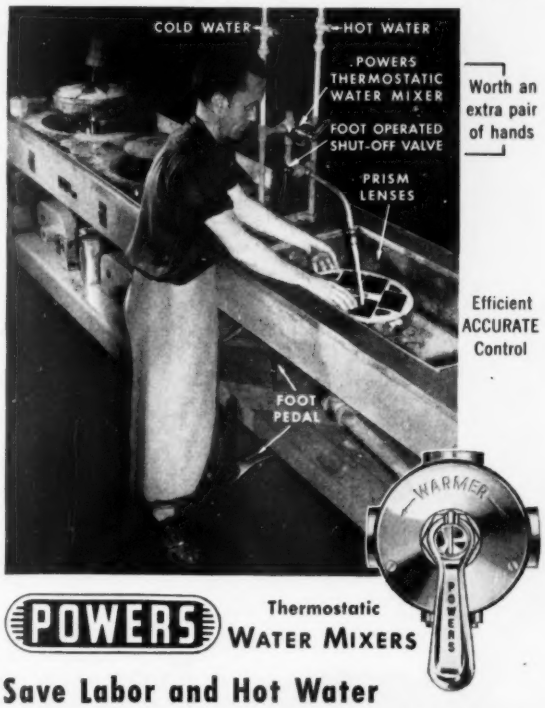

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Efficient ACCURATE Control

POWERS Thermostatic WATER MIXERS

Save Labor and Hot Water also Help Prevent Damage to Lenses

Photo above shows one of 75 washing operations in ARGUS CAMERAS, Inc. large modern lens polishing department. Here lenses are made for their popular line of cameras, projectors and optical instruments used in our nation's defense.

Combination of a Powers Type H Thermostatic Water mixer and a BRADLEY foot operated shut-off valve releases both of worker's hands for lens washing. Accurate control of water temperature prevents damage to lenses. Instant shut off of washing water by foot operated pedal prevents waste of hot water.

Double-Safety Feature of POWERS Water Mixer shown above: It *thermostatically* mixes hot and cold water and delivers the mixture at any temperature desired regardless of **pressure** or **temperature** changes in water supply lines. Failure of cold water instantly shuts off the delivery. Users often report accuracy of ± ½° F. Capacity 2 to 10 gpm @ 45 psi. *Write for Bulletin 365.*

Larger Capacity Water Mixers available up to 1200 gpm @ 45 psi. Write for Catalog WC. (b66)

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For more facts circle 660 on Reply Card

DATA FILE

(Begins on page 202)

415 **Refrigeration Controls**—Bulletin 109 describes the application of mercury-bulb instrumentation down to —30 F. Instruments presented cover conditions normal to food and drug processing, petro-chemistry, air conditioning, baking, etc., and include indicating, non-indicating, recording types. The Partlow Corp.

LUBRICANTS, LUBRICATION

416 **Automatic Lubrication** — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 pints with 1 to 24 feeds per unit. Hills-McCanna Co.

417 **Bearing Lubrication**—Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The special requirements of porous bearings are also discussed. The Texas Co.

418 **Force Feed Lubricators**—12-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Discusses drive arrangements. Manzel Div., Frontier Industries, Inc.

419 **"Dag" Dispersions at Work** — How "dag" colloidal dispersions serve industry is told in 12-pp illustrated Catalog 460. A table lists 40 basic dispersions of graphite, molybdenum disulfide, vermiculite, and zinc oxide in various carriers. Comparative particle size and consistency of each dispersion is given, as well as typical uses. Acheson Colloids Co.

ELECTRICAL EQUIPMENT

421 **Motor-Generator Reference Book**—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their application and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control. Allis Chalmers Mfg. Co.

422 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

423 **Motor Controls**—In this 28-pp bulletin the most important items in company's line of standard motor control apparatus for all industries are presented. Controls, starters and accessories are described and applications listed. Allen Bradley Co.

424 **Polyphase Motors**—Bulletin 103 provides design features of company's Loadstar polyphase motors conforming to new NEMA standards and also gives tabulated information on the changeover. Open dripproof and totally enclosed fan cooled motors are covered. Photos show construction details. Leland Electric Co.

425 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them and pictures enclosures. Square D Co.

426 **Motor Starters**—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type ZHS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

427 **Productive Maintenance** — Publication GED-1691 is a pocket-size 104-pp source of information of value to plant engineers who want to get more production from their present motors, generators and control equipment. Besides general maintenance suggestions, the booklet contains trouble shooting charts and recommended renewal parts guides. Also provides wire and cable data and includes a section of formulas and other data pertaining to motors and generators. General Electric Co.

428 **Toggle Switch**—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches, which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

429 **Plug-In-Power**—Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

430 **The Answers on Wiring**—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights, and lengths, as well as a partial list of users included. General Cable Corp.

431 **Power and Control Cables** — Sixty-pp Catalog 24 describes typical power and control

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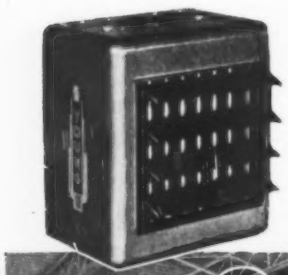
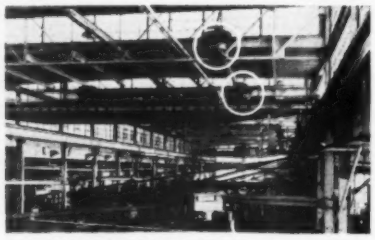


Young Type "SH" Unit Heaters installed in warehouse of large perishable food wholesaler provide efficient heat without damage to produce.



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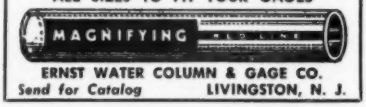

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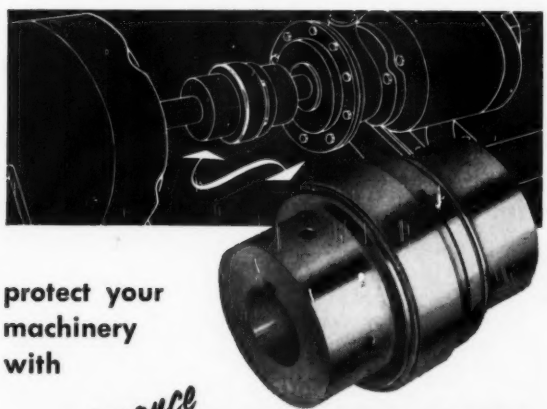

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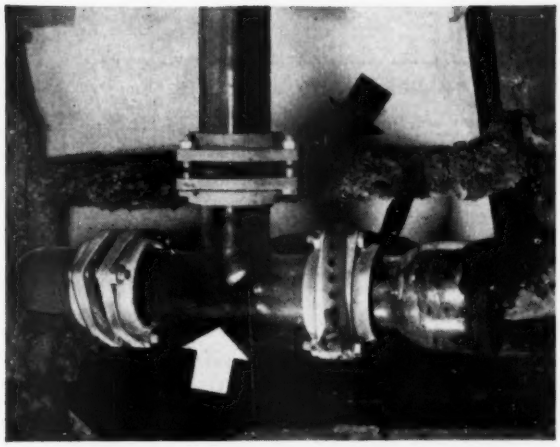

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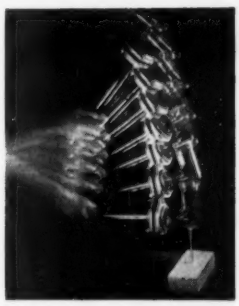

Hammering home a nail with a piece of PYREX brand "Double-Tough" glass pipe demonstrates its strength.

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DATA FILE

(Begins on page 202)

cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

432 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

433 **Battery Maintenance Tips**—Form 5063 is an 8-pp pocket-size booklet on storage battery maintenance which breaks down battery care to seven basic rules, each emphasized by cartoon treatment and brief text. Booklet is suited for distribution to maintenance personnel as well as to those indirectly associated with batteries, such as purchasing department personnel. Includes suggested maintenance chart forms. Exide Industrial Div., The Electric Storage Battery Co.

434 **Stationary Batteries**—Specification Bulletins CP-536 and CP-537 cover a complete line of lead-calcium and lead-antimony batteries for control, switchgear, and auxiliary power applications. The specifications include data on battery ratings and capacities, details of design and construction, dimensions, weights, and types of containers. C & D Batteries, Inc.

435 **Retractile Cords** — This 8-pp bulletin presents retractile cords for general communication and power applications. Containing catalog data and ordering information as well as application photos, explains how the cords are made, where used, and advantages offered. Koiled Kords, Inc.

436 **Flexible Cords** — This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

LIGHTING

437 **Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

438 **Precision Lamps** — Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

439 **Lighting Fixtures**—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

440 **Lighting Fixtures**—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting, Inc.

BOILERS, GENERATORS

441 **Efficient Little Boiler**—Bulletin AD-135 describes company's CB-50-80 boilers available in 50 to 80 hp (15 to 150 lb steam, 30 lb hot water) for heating and processing. Stresses such advantages as silent operation, fuel flexibility, speed, easy maintenance, and automatic operation. Discusses new hinged front and rear doors, forced draft systems, other features. Cleaver-Brooks Co.

442 **For Lower Steam Costs**—Have you Checked Your Steam Costs Lately?" is a 16-pp, non-technical picture and caption presentation; it serves to focus attention on high-cost features of antiquated boiler equipment. The first part of the booklet emphasizes typical boiler plant problems. The latter part illustrates packaged automatic boiler installations in industrial plants, others. Orr & Sembower, Inc.

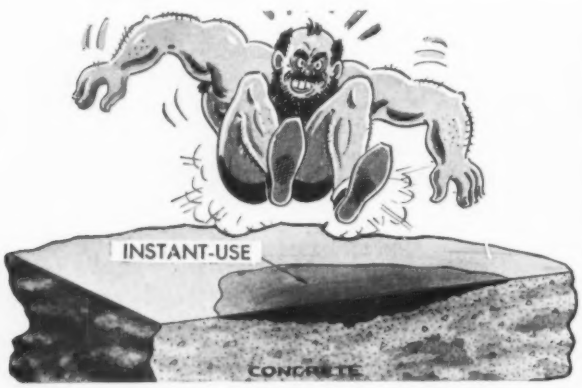
443 **Steam Generators**—Data and specifications for completely plant assembled water-tube steam generators are contained in this 8-pp bulletin. They cover nine sizes from 5,300 to 33,000 lb steam per hour and for pressures up to 400 psi. These units are designed for fully automatic firing with oil, gas or stoker-fired coal. Superior Combustion Industries, Inc.

444 **Steam Generators**—"Cyclonic combustion," a new method of heat transfer is discussed in this bulletin. Descriptive drawings show how air is introduced into combustion chamber at high speeds in revolving spiral vortex, radiating heat to fire tube through direct radiation and convection. Cyclotherm.

WATER TREATING

445 **Condensate Line Corrosion**—Attributing condensate line corrosion chiefly to carbon dioxide in the steam and water, Technical Paper 127 discusses various methods of minimizing boiler feedwater alkalinity, especially the use of filming amines. Reports field results under various conditions. W. H. & L. D. Betz.

446 **Information on Ion Exchangers**—Here are three booklets on ion exchangers: Nalcite HCR, a styrene type cation exchanger; Nalcite SAR, a basic anion type; and Super Nalcolite, a synthetic gel type zeolite for cation exchange. Tables and graphs explain performance of these water treating resins under



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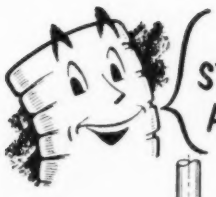
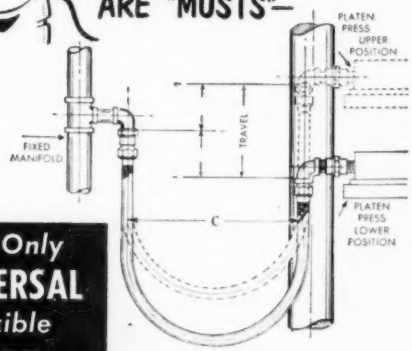


WHEN BOTH STEAM and MOTION ARE "MUSTS"—



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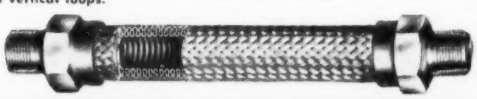

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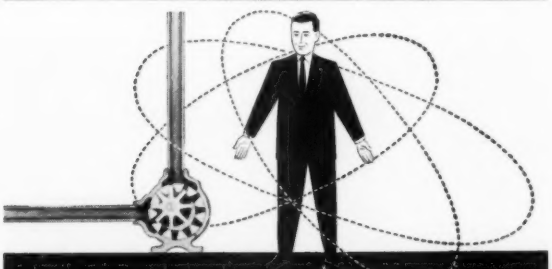

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DATA FILE

(Begins on page 202)

various operating conditions. Physical characteristics, exchange capacities, regeneration techniques given. National Aluminate Corp.

FANS, BLOWERS

447 **Fan Engineering Data**—Bulletin A-108, 16 pp, gives fan laws and formulas, terminology and recommended velocities for exhaust hoods. Includes air pressure conversion table, charts on dust resistance, entrance losses and rectangular equivalent of round ducts. Discusses fan installation, maintenance and lubrication, also noise. Hartzell Propeller Fan Co.

448 **Industrial Fans** — Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data of Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

449 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

450 **Industrial Exhaust Fan**—Housing design, wheel construction and standard arrangements of manufacturer's Type EX exhausters are discussed in illustrated Bulletin C-46EX. Provides capacity tables, dimensions and photos of standard and special fan. Bayley Blower Co.

SAFETY, SANITATION

451 **Fire Extinguisher**—How to Extinguish a fire in 11 sec by use of the Fyr-Fyter instant extinguisher with "loaded stream" chemical liquid, "Karbaloy," is pictured in Bulletin F-1158. Lists advantages of 500 lb stainless steel model. The Fyr-Fyter Co.

452 **Dry Chemical Extinguishers** — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

453 **Advice on Washrooms**—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

OTHER EQUIPMENT

454 **Continuous-Cast Bronzes** — This 12-pp bulletin describes, illustrates Asarco continuous-cast bronze products including copper alloy rods, valve guides, air brakes, packaging machinery. Tables include typical physical properties of foundry alloy cast by three methods; impact tests revealing high safety factor for heavy-duty parts. Lists specifications, sizes, weights on rods, bars. American Smelting and Refining Co.

455 **Industrial Leathers**—These illustrated data sheets cover company's leather products and include specifications on various types of leather belting. Also gives data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

456 **Industrial Non-Metallics** — Polypenco Nylon, Teflon, filled nylons, and other non-metallics are the subject of this bulletin. Illustrated with photos, gives characteristics and advantages of these materials, data on rod, strip, tubing and slab available, parts that can be produced. Polymer Corp. of Pennsylvania.

457 **Improved Hose Coupling** — A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Titeflex, Inc.

458 **Handbook on Fluid Circuits**—Now available to plant engineers is the second printing of "The Circuit Rider." This 32-pp pocket-size manual presents a down-to-earth discussion, together with drawings, of basic designs in fluid power circuits and points out the wide range of operations possible through the application of different types of such circuits. The Logansport Machine Co., Inc.

460 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

461 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels, other advantages. Air Preheater Corp.

462 **Industrial Dry Coolers**—Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium size unit. The Marley Co., Inc.

463 **Magnetic Pipeline Traps** — Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from lines. Eriez Mfg. Co.

464 **Engineered Vibration Control**—Bulletin 104 presents spring, cork and rubber mountings, discusses advantages of each and use alone or in combinations. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co.

How to get more production from steam-consuming units

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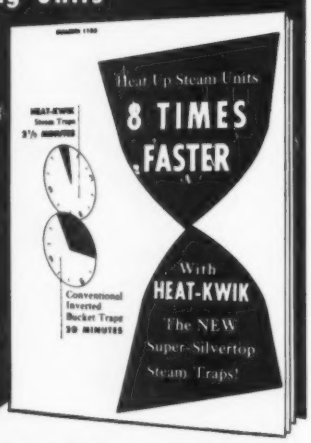

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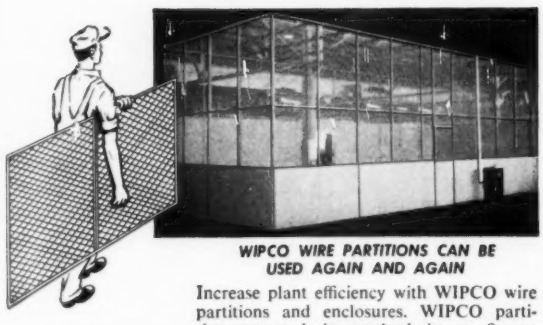

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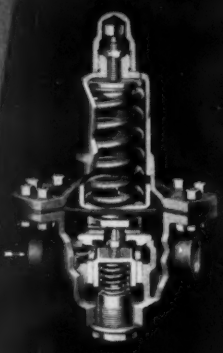

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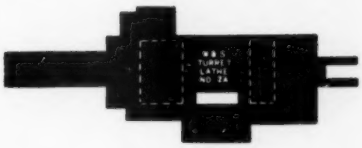

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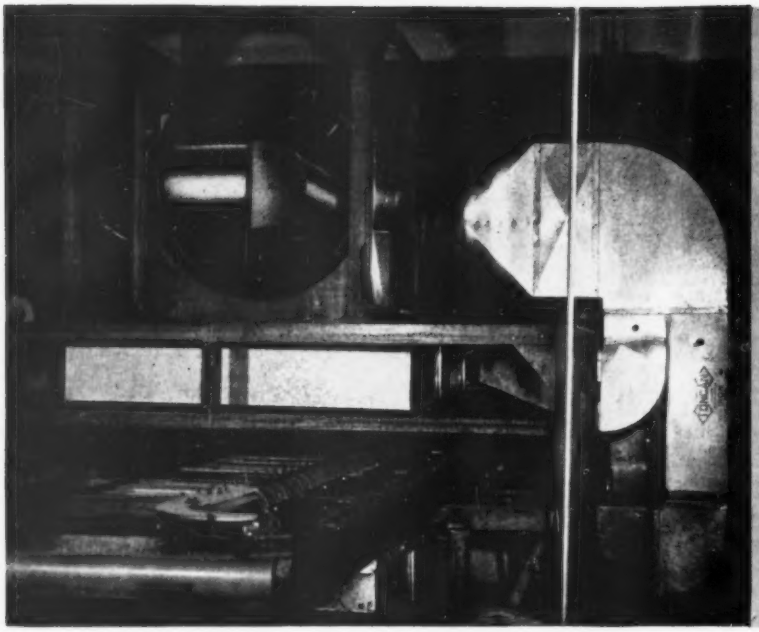

HIGH TEMPERATURE VANEAXIAL BLOWER

Special design locates drive on the negative pressure side, exposed to outside air, never to the air being moved. Makes it possible to convey air at temperatures up to 350° and air containing acids and alkalies without fear of premature failure of belt and bearings. Ten sizes, 12″ to 54″. Air deliveries to 88,000 CFM.

Hartzell High Temperature Vaneaxial Blowers

speed flow of printed textiles through 325° drying ovens

A New England textile printing and dying company gained a substantial competitive advantage when a Hartzell representative showed them how a special Hartzell blower could solve their special air-moving problem.

Company engineers knew that forced air circulation would reduce the time needed for drying. They also knew that no ordinary air-moving equipment would stand up under the temperatures existing inside the ovens. Then they heard about Hartzell's special high temperature vaneaxial design and the solution was in sight.

An initial installation of two blowers on a drying unit proved highly successful. As a result, a new oven, employing four HVA 36″ BD blowers each driven by a 25 hp motor was planned. In this oven, (shown above before the insulating housing was installed), each blower recirculated 325° air through top and bottom plenum chambers with slots 6″ apart. Each blower delivers approximately 30,000 CFM against 1″ static pressure.

Rugged, reliable Hartzell fans are on the job wherever air is moved in industry. General ventilation—exhaust of heat, smoke or fumes—cooling—drying—whatever you want to do with air, there's a Hartzell fan to meet your exact needs. And your nearby Hartzell field office brings the engineering know-how of the whole organization right into your office. Tell us about your air-moving problem. We'll find an answer. Write today.

The installation shown here was handled by the Hartzell field office at Fairfield, Connecticut; phone Clearwater 9-3340 or 9-3349.

HARTZELL *propeller fan co.*

Div. of Castle Hills Corp.

Name _____

Company _____

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If student, check here for special information ☐

Dept. S

PIQUA, OHIO

PROPELLER-TYPE FANS • BLOWERS
ROOF VENTILATORS • UNIT HEATERS

ENGINEERING OFFICES IN PRINCIPAL CITIES

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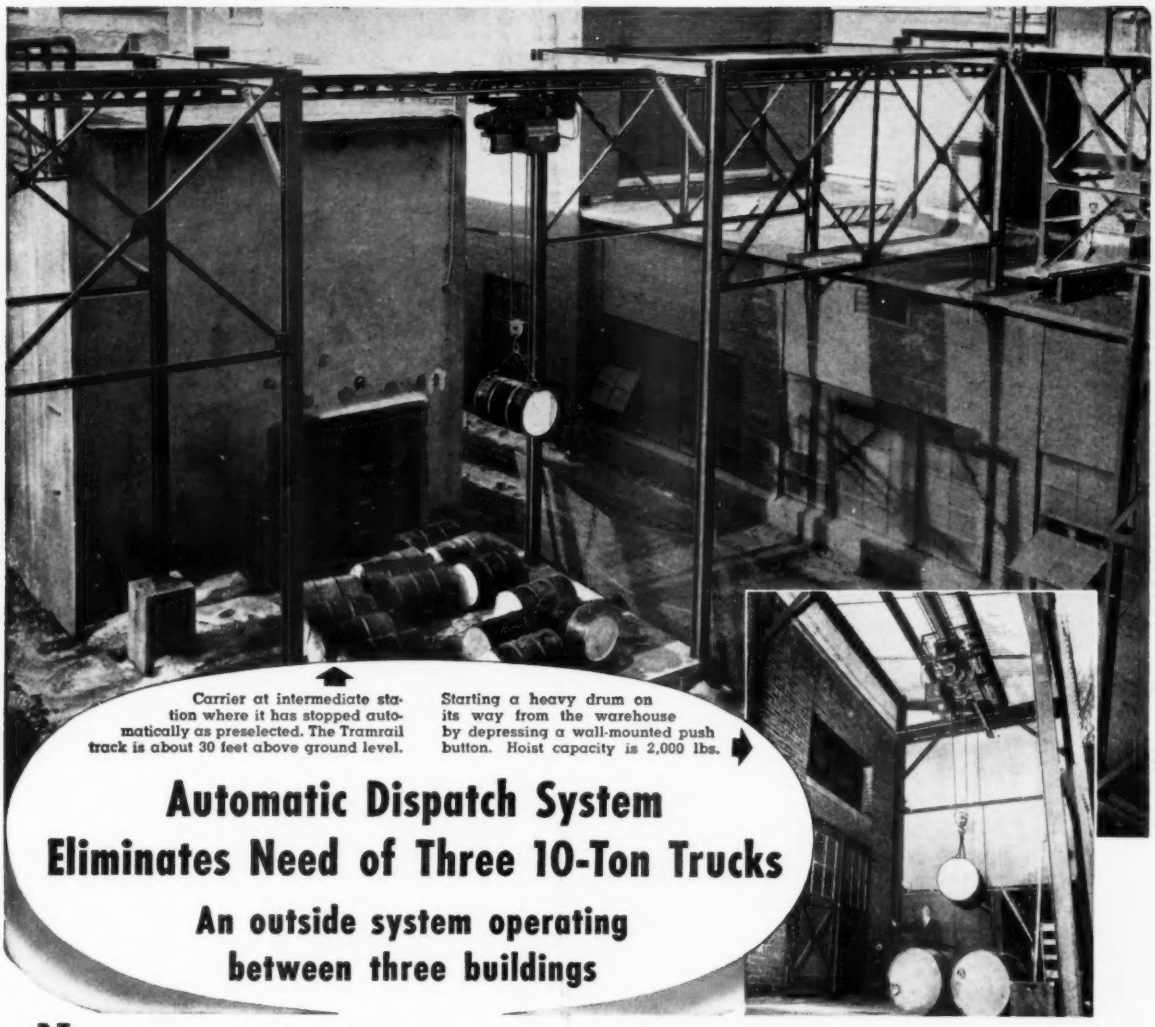

Carrier at intermediate station where it has stopped automatically as preselected. The Tramrail track is about 30 feet above ground level.

Starting a heavy drum on its way from the warehouse by depressing a wall-mounted push button. Hoist capacity is 2,000 lbs.

Automatic Dispatch System Eliminates Need of Three 10-Ton Trucks

An outside system operating between three buildings

Not only was the need of two 10-ton trucks obviated by a Cleveland Tramrail automatic system at the Mica Insulator Company, Schenectady, N. Y., but the purchase of a third truck was made unnecessary. While the trucks had to travel over a circuitous route, only a short, straight Tramrail track is required for the overhead system.

Many man-hours of trucking and handling time are saved because materials dispatched over the automatic Tramrail system can be handled by production workers along with their regular jobs. A great amount of handling on an elevator has also been eliminated and better elevator service is available for other purposes.

The system has been found particularly helpful during night shifts when an extra drum of varnish or roll of cloth is sometimes needed. Formerly trucks were never available for night hauling. The Tramrail equipment paid for itself out of savings it created in a short period.

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7565 East 284th St., Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

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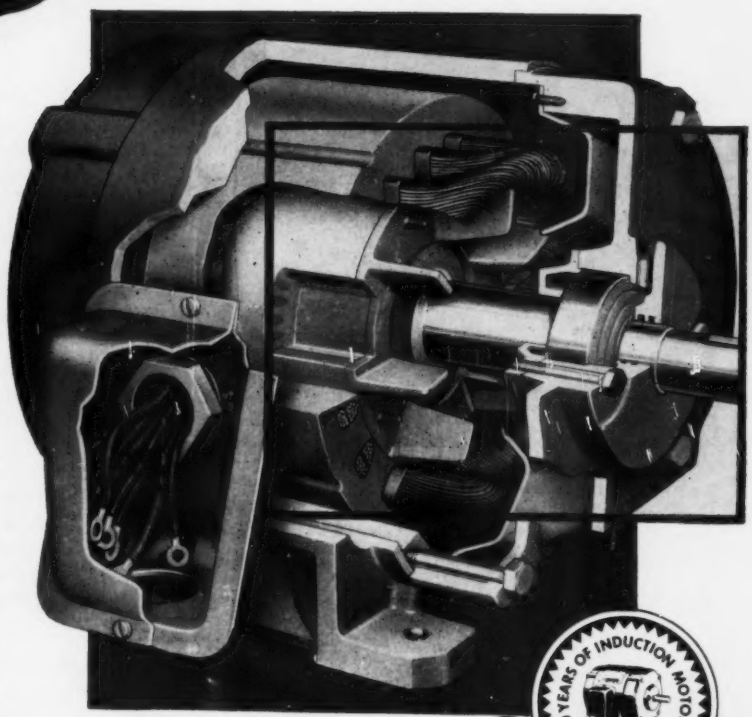
It takes Six Bolts –

not just four

to give full bearing protection for greater motor performance



THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.

50 YEARS OF INDUCTION MOTORS
ALLIS-CHALMERS-NORWOOD WKS.

Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

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A-4443

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DECEMBER, 1954

Plant Engineering

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